

DRAFT REPORT

Broadband Telecommunications Report

Seattle City Light

MARCH 31, 2008



PLEXUS RESEARCH and R. W. BECK BROADBAND TELECOMMUNICATIONS REPORT

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EXECUTIVE SUMMARY

Background

The City of Seattle (City) and Seattle City Light (SCL) requested Plexus Research (Plexus) and R. W. Beck, Inc. (collectively, the Project Team) to investigate critical aspects of SCL participation in a proposed new telecommunications project. The intent of the project is to deliver highly valued benefits identified in the “Report of the Task Force on Telecommunications Innovation – City of Seattle”, dated May 2005 (Task Force Report). The Task Force Report envisioned “Broadband for All” to enable Seattle”to remain vibrant and prosperous in the future.” SCL is enthusiastic about participating in this endeavor wherever it might be prudent to do so. Based on conversations with the City and SCL, the Project Team understands the project to be defined as follows.

- The network would be founded on a fiber to the premise (FTTP) architecture.
- The City and SCL would make its telecommunications assets available to the success of the project where ever feasible.¹
- The project would provide, as envisioned by the Task Force Report, high-speed Internet, local voice and cable television services. Cellular voice would not be provided.
- SCL has plans to launch Advanced Metering Infrastructure (AMI) services using radio frequency technology (radio). SCL inquired if the plans could be leveraged by the use of FTTP as an alternative technology. That issue is evaluated in this report.
- The new enterprise would primarily serve residential and small business customers.
- The new enterprise has not identified any third parties to share project responsibilities.
- The delivery of telecommunications services will be on a for profit basis.
- The new enterprise may need to be independent of the City and SCL. This assumption is based on the Okeson decision.²

This report is organized in a manner that closely follows the Project Team’s scope of work that is attached to the City’s Agreement No. 2008-04. Specific report sections are listed below.

¹ The availability of such assets may be subject to legal and regulatory constraints. A discussion of related information is found in Section 5 (Legal and Regulatory Review).

² Ibid.

EXECUTIVE SUMMARY

Section 1 (Review of Existing Studies): Reviews existing studies that were provided to the Project Team by SCL and discusses pertinent aspects of the project.

Section 2 (Critical Issues): Discusses important issues that could impact the success of the project.

Section 3 (Critical Success Factors): Presents a number of issues that, based on the Project Team's experience in similar matters, should be considered by the City to improve the likelihood that the new enterprise would be successful.

Section 4 (SCL Effects): Identifies how the new telecommunications enterprise would impact SCL.

Section 5 (Legal and Regulatory Review): Provides a non-legal opinion and analyses of existing laws and regulations that could impact the project.

Important Findings

The analyses contained in this report provide the basis for the following salient findings. Additional information on each item is contained in the pertinent sections that follow.

- **Technical Feasibility:** The proposed FTTP network appears to be well suited to providing local voice, cable television and high-speed Internet services. FTTP also has the capacity and flexibility to provision future advanced telecommunications services. FTTP can be used for AMI, though such deployment is not currently economical.
- **FTTP for AMI Purposes:** FTTP technology for AMI services was not evaluated in a Plexus report, "Advanced Metering Infrastructure (AMI) Value for City of Seattle", dated November 30, 2006 (2006 AMI Report). Plexus assessed FTTP for AMI and concluded that AMI over an FTTP architecture will increase the cost of SCL's AMI solution. FTTP provides limited (beyond those provided by radio) additional AMI benefits. These identified benefits are insufficient to offset the higher cost to deploy FTTP for AMI services.
- **Partnerships:** Available studies recommend that the City should partner with a third party to build-out and operate the FTTP network. This approach is not feasible since such studies were unable to identify any suitable third parties.
- **Rights-of-way and Easements:** The City's easements and rights-of-way need to be modified and approved to reflect the addition of telecommunications services.
- **North American Electric Reliability Council:** The North American Electric Reliability Council's rules are expected to preclude the telecommunications enterprise's access to many of SCL's substations and operations center.
- **SCL Power and Reliability:** SCL has identified locations where it can deliver power of high quality and low risk of power interruption. This is a critical commodity to the success of the endeavor.

- **Organizational Structure:** The implications of the Okeson case may require the new telecommunications enterprise to function as a completely independent entity.
- **Human Resources:** The new telecommunications enterprise would employ 137 to 190 FTE in the next five to ten years. These will be relatively highly paid skilled positions.
- **Financial Risks:** Financial risks have not been estimated. Until a new enterprise is identified and its structure established, it is unclear whether stakeholders are willing and able to accept the risks associated with launching a new telecommunications business.
- **Revisions to Financial Forecasts:** This report identifies a number of recommended revisions to the available pro forma analysis. Such changes are expected to decrease forecasted net income and lengthen the time required to break even. Changes to the pro form include increased cost of cable television programming, pole attachment fees, cable television franchise fees, taxes, cost of perfecting existing easements, implementing conservative market share assumptions, labor rates and labor overheads.
- **Lost Revenue from Cable Television Franchise Fees:** Financial gains from cable television will be partly offset by a reduction in revenues to the City from its Comcast's franchise fee.
- **Cable Television Revenues:** Approximately half of total telecommunications revenues would come from provisioning cable television.
- **Cable Television Market Penetration:** Cable television market penetration is likely to come about by taking market share from incumbent providers, which is expected to encourage some competitive response.

Section 1

REVIEW OF EXISTING STUDIES

1.1 Introduction

The City received two reports that examine its proposed telecommunications project: “Financial Feasibility of Building and Operating a Fiber Network in the City of Seattle”, dated May 15, 2007 (CCG Report) and “Report of the Task Force on Telecommunications Innovation – City of Seattle”, dated May 2005 (Task Force Report). Both reports shed important light upon the proposed new enterprise and offer valuable observations and recommendations. It must be noted that the CCG Report states that its engineering design is “high level” and therefore some degree of subsequent refinement is probably expected by the author. As both reports are preliminary in nature some additional concerns may require the City’s attention prior to committing to the project.

Comments regarding each report are presented below.

1.2 CCG Report

- **Legal Factors:** Some of the comments found in this section are influenced by the Project Team’s understanding of the legal constraints that confront the City. Specifically, the Washington State Supreme Court’s ruling on *Okeson v. City of Seattle*, 150 Wn.2d 540, 78 P.3d 1279 (Okeson). The implications of this 2003 decision appear to be omitted from the 2007 CCG Report and are discussed in greater detail in Section 5.
- **Regulatory Factors:** The North American Electric Reliability Council’s (NERC) rules are of special importance. NERC rules continue to evolve.
- **Partnerships:** The CCG Report states that, “the best outcome for the City would be if a commercial retail provider made the investment to build the fiber network and offered a full array of services over the network. Although no such player emerged during the RFI process....” This observation is apparently contradictory since the best outcome appears to be one that is not feasible. Clearly, if a third party developer/operator is not available, then the City would need to perform such critical tasks itself.
- **Technical Feasibility:** The proposed design adequately provides the technical capability to provision advanced telecommunications services (e.g. local voice, long-distance voice, digital and analog cable television, and high-speed Internet) to the City’s residential constituents.

- **Competitive Response:** The CCG Report forecasts that the City will capture a considerable percentage of the market for telecommunications services. However, since the Seattle market is assumed to be relatively mature, a new entrant can gain market share only by taking customers from an incumbent. The CCG Report does not address competitive response, which might include price competition, product differentiation through service bundles or legal/regulatory challenges. Since the CCG Report indicates that the City can achieve the desired market penetration by offering services at a 20 percent price discount, it is reasonable to assume that price competition will be a response from incumbents. This response provides the desired objective of lower cost services to citizens. It does not ensure that incumbents provide higher speed Internet access. It offers citizens a choice. No market study available to the Project Team answered the question, “At what price are current service levels acceptable?” If the market determined that speed was not as important as price, the City might not achieve its market share target without further reducing price and this would erode the financial feasibility of the project and its participants. Second, incumbents might respond (as indicated by current offerings) with bundled services and, by adding wireless voice (telephone), could further differentiate themselves, thereby creating a competitive advantage over the City. This is especially important since it appears that the City is not interested in offering cellular telephone services. Lastly, an incumbent’s legal/regulatory challenge to the City’s new enterprise is likely to cause a significant delay in product launch. Such competitive responses are not mutually exclusive and actual effects could include combinations of the above.
- **Financial Risk:** The financial risks associated with higher than expected capital and operating costs, or, lower levels of market penetration need to be defined. Later in this report, the importance of penetration rates on AMI services that might be offered by the City will be further developed. Penetration rates will have a direct impact on the cost of AMI if FTTP is the primary technology for meter reading. Moreover, the financial risks associated with the new enterprise may need to reside with that enterprise and not affect the City.
- **Cost of Debt Financing:** The CCG Report assumes that the new telecommunications enterprise would be able to borrow sufficient funds to finance the network at an interest rate of 5.2 percent. The interest rate associated with such borrowing appears to be based on CCG’s experience in working with municipal projects. The Project Team did not investigate the borrowing rate for the City or for SCL. Section 5 of this report examines the legal and regulatory factors that might affect the project, including the implications of a recent Washington Supreme Court decision that is commonly known as the Okeson case. One outcome of Okeson is that the telecommunications enterprise might not be able to borrow funds (e.g. bonds) as a City entity. Since the telecommunications enterprise is new and would not have any track record of generating income or being financially solvent, it is the Project Team’s opinion that the assumed interest rate is too low, thereby underestimating the cost of debt. The Okeson decision also casts doubt that SCL might borrow funds for purposes of creating a telecommunications enterprise if a risk premium is applied by institutions that

lend to SCL. A risk premium applied to SCL borrowing could arguably result in electric rate payers in effect subsidizing the borrowing cost of the enterprise.

- **Cable Television Revenues:** The market research contained in the CCG Report is used to substantiate market penetration rates for cable television, voice and high-speed Internet. Market penetration rates subsequently drive forecasted revenues, which are critical to the financial success of the enterprise. The most significant source of revenue is forecasted to be cable television, representing approximately 45 and 48 percent of total revenues in years five and ten, respectively. Such revenues are based on the forecast that the new enterprise will capture 40 percent of the market by year 10, which may be optimistic.
- **Human Resources:** The successful operation of a telecommunications enterprise requires a significant number of uniquely skilled staff. The CCG Report forecasts the number of full time telecommunications employees (FTE) to be 137 and 190 in years five and ten, respectively. The Project Team’s preliminary analysis indicates that the City’s existing staff does not have the number of required staff or the right skill sets. Consequently, the City would need to either hire a significant number of new FTE (if it provided services alone) or rely on its partner to supply such staff.
- **Labor Overheads:** The CCG Report assumes that labor overheads are fixed at 30 percent throughout the planning horizon. Based on data from the City, it appears that 36 percent would be more reasonable. In this regard, the pro forma found in the CCG Report underestimates total labor expense and overstates net income.
- **Labor Rates:** The labor rates assumed in the CCG Report are low in comparison to the Seattle labor market.³ This is especially true for professional staff, such as programmers, engineers, accountants and other technical personnel. To illustrate these differences, the City’s mid-point pay scale and CCG’s assumed rates are shown in the following table. CCG’s labor rates are shown to be roughly 20 percent below the City’s labor rates. Consequently, the CCG Report underestimates labor expense and overstates net income.

Table 1-1-Labor Rate Comparison

FTE Title	City of Seattle ⁽¹⁾ (\$/Year)	CCG Report (\$/Year)
Senior Accountant	\$61,262	\$50,000
IT Programmer	\$60,614	\$50,000
Electrical Engineer	\$64,749	\$40,000 to \$55,000

Notes: (1) Mid-point salary step.

- **Cable Television Market Penetration:** CCG’s market survey suggests that 63 percent of the addressable market is currently purchasing cable television and

³ This discussion only considers direct labor. The overhead or indirect components of labor expense are discussed elsewhere.

an additional 14 percent are purchase satellite services (77 percent total). These figures support the Project Team's contention that the enterprise will be entering a mature market. Survey data may be overstated, especially in light of data from the National Cable & Telecommunications Association, which estimates the national cable television take rate as being 58 percent (dated September 2007). The Project Team did not identify comparable estimates of satellite penetration to add to the 58 percent.

- **Cable Television Market Share:** The market research contained in the CCG Report is used to substantiate market share for cable television, voice and high-speed Internet. Market share forecasts subsequently drive forecasted revenues, which are critical to the financial success of the enterprise. The cable television market shares are forecasted to be approximately 26 and 40 percent by years five and ten, respectively. It is the Project Team's opinion that such share percentages suggest that Comcast and other local cable and satellite television providers would respond aggressively. This supports the City's goal of reducing video cost to citizens but threatens the financial viability of the telecommunications enterprise.
- **Market Research:** Market research is critical to forecasting penetration rates and market share of the proposed enterprise. The CCG Report includes a market survey, but fails to address several key questions: respondents' perceptions of incumbent providers, respondents' perceptions of the City and whether respondents currently have term-based contracts for telecommunications services. Responses to the first item would have provided insight into where incumbents are weak, if at all. Alternatively, strong favorable perceptions of incumbents would discount respondents' willingness to change providers in exchange for a 20 percent discount. Also, it has become commonplace in the telecommunications industry for incumbents to provide price discounts for bundled services or multiyear contracts. Such contracts are expected to cause delays in changing service providers, which in turn causes a delay in the enterprise's cash flow.
- **Churn:** Customer churn has become a revolving door for some telecommunications customers, switching from one service provider to another in exchange for price discounts or other short-term advantages. The CCG Report's over emphasis on price discounts may inadvertently identify that segment of the overall market that is especially susceptible to churn. Since such customers are ones that are most likely to switch to the City's offering in exchange for a price discount, they may also be the ones that are most likely to leave the City when incumbents offer a bungled service price discount.
- **Value of Competition:** The CCG Report finds that 70 percent of residential respondents would like to see more competition for cable television, voice and Internet services. It is the Project Team's opinion that wanting more choice is not the same as wanting to switch service providers. It has been our experience that respondents may perceive competition as a means to obtain lower prices without having to switch service providers.

- **Revenue from Business Customers:** The pro forma found in the CCG Report indicates that considerable revenue comes from business customers, yet the survey was only distributed to residences. The basis for forecasting market penetration among business customers is unclear.
- **Pole Attachment:** The CCG Report states that there would not be any expenses associated with pole attachment. The discussion of the implications of the Okeson case found in Section 5 suggests that the telecommunications enterprise will need to pay pole attachment fees in the same manner as any other third party. This omission underestimates expenses and overstates net income.
- **Organizational Structure:** It is the Project Team's opinion that, based on the implications of the Okeson case, the telecommunications enterprise will need to function as a completely independent entity. This assumption appears to conflict with the CCG Report's assumption that the new enterprise would essentially be a new department within the City.
- **Buildings:** It appears that the cost of buildings for the new enterprise's FTE is not fully included. While a building expense is shown to be \$1.75 million in year 1, the cost of land is shown to be zero.
- **Lost Revenue from Cable Television Franchise Fees:** Comcast pays the City a franchise fee in the amount of approximately \$12 million per year. This figure is significantly influenced by the number of customers that are served by Comcast. Since the CCG Report forecasts that the enterprise would capture 40 percent of the cable television market by year 10 and the Project Team further assumes that most of these customers would come from Comcast, it is reasonable to infer that Comcast's payments to the City would be reduced by approximately 40 percent. The CCG Report does not appear to account for this effect.
- **Cable Television Franchise Fee Expense:** Assuming that the Okeson decision requires the new enterprise to operate independently, then it is reasonable to assume that it will be required to pay the City a franchise fee in the same manner as other telecommunications service providers. The CCG Report does not appear to account for this effect.
- **Cable Television Programming:** The CCG Report assumes that cable television programming would be purchased from the National Cable Television Cooperative (NCTC), which offers discounted rates to its members. The CCG pro forma forecasts the cost of cable television programming to be roughly \$33.8 million in the fifth year of operation. This expense has a very significant impact on financial performance, accounting for approximately 55 percent and 71 percent of the enterprise's total expense in years five and ten, respectively. The NCTC obtains discounts from suppliers by capturing economies of scale through aggregating the demand of its member systems. However, CCG notes that NCTC has had a moratorium on new membership since November 2005. Consequently, it is unlikely that the new telecommunications enterprise would be able to obtain the programming rates that are assumed in the CCG Report. The CCG Report mentions, but does not model, alternatives to utilizing NCTC. CCG's alternatives are assumed to cause a 15 to 30 percent increase in the cost of

cable programming. A 15 percent increase in the cost of programming would translate into an increase in operating expense of approximately \$5 million in year five.

- **Customer Satisfaction and Synergy:** If the new enterprise provides attractively priced reliable services, it could further enhance the City's reputation with its constituents. Successful, reliable, customer friendly offerings could result in successful cross marketing of City services. Poor quality, intermittent reliability, perceived high cost or deficient offerings relative to competitive offerings will similarly negatively impact the City's reputation and that of SCL, even though electric service is provided by a distinctly separate entity.

1.3 Task Force Report Review

The City of Seattle conducted an assessment of provisioning advanced telecommunications services to its constituents titled, "Report of the Task Force on Telecommunications Innovation", dated May 2005 (Task Force Report). The following comments our review of this report.

- **Cable Television Penetration:** The preceding discussion notes that providing cable television services is important to the financial viability of the telecommunications enterprise. Clearly, revenues will be a function of the size of the available cable television market. CCG's survey finds that that 77 percent of the addressable market is currently purchasing cable television and satellite services. In contrast, the Task Force Report suggests that 65 percent of the market is utilizing these services. This apparent discrepancy needs to be resolved.
- **Customer Satisfaction (or Not) with Incumbents:** The CCG survey (May 2007) reported 77 percent or 12 percent higher cable or satellite penetration than the Task Force Report (May 2005). This difference could be attributed to a number of factors, including growth over two years, increased citizen satisfaction and acceptance of incumbent offerings, different survey methods, inclusion of satellite television. A stronger competitive position by incumbents is the opposite of the environment anticipated in the reports. Routine updating of competitor market share is important.
- **Telecommunications Revenues from the City:** One important assumption is that the City would be an anchor tenant to the new enterprise. The Task Force Report notes that the City is currently spending approximately \$5.2 million per year on telecommunications services. It is expected that many, but not all, of these services could be served by the new enterprise, as shown in the following table. This high-level analysis assumes that all of the City's Internet usage all leased lines and 75 percent of local dial tone services could be served by the new enterprise. From the City's point of view, future year's total telecommunications expense would be approximately \$4.5 million with \$2.4 million being paid to incumbent service providers and \$2.3 million to the new enterprise. This model forecasts that the City would be saving approximately \$564,000 per year.

Table 1-2-City Anchor Revenues

Services	City's Current Expense ⁽¹⁾ (\$/Year)	Future Rev. to Incumbents (\$/Year)	Future Rev. to New Enterprise ⁽²⁾ (\$/Year)	City's Future Expense (\$/Year)	City's Future Savings (\$/Year)
Cellular Services	\$1,728,934	\$1,728,934	\$0	\$1,728,934	\$0
Internet Services	\$106,316	\$0	\$85,053	\$85,053	\$21,263
Leased Circuits	\$2,078,368	\$0	\$1,662,694	\$1,662,694	\$414,674
Local Dial Tone	\$857,189	\$214,297	\$514,313	\$514,313	\$128,579
Long Distance	\$108,140	\$108,140	\$0	\$108,140	\$0
Paging Services	\$223,590	\$223,590	\$0	\$223,590	\$0
Wireless Modem	\$143,294	\$143,294	\$0	\$143,294	\$0
Total	\$5,245,831	\$2,418,255	\$2,262,060	\$4,466,018	\$564,516

Notes:

- (1) Source: Task Force Report
- (2) Assumes a 20 percent price discount

2.1 Introduction

The Project Team investigated available reports and information in order to identify any critical issues that may be a part of the proposed new telecommunications enterprise. Attributes under consideration include technical, AMI and penetration, pro forma, and legal/regulatory. The results of this investigation provide the City with forthright feedback about areas of concern in moving forward with a new telecommunications project.

2.2 Technical

- **Technical Feasibility:** In regard to creating a FTTP network and provisioning local voice, cable television and Internet services, the Project Team did not find any critical issues with the proposed high level design. It should be noted, however, that available designs are only conceptual in nature and additional analysis is required to fine tune cost estimates.

2.3 AMI

- **Background:** Plexus Research, with input from key personnel at Seattle City Light, prepared the 2006 AMI Report and submitted it to the management team of SCL. The report contained information important in this current consideration of FTTP.
- **Fiber Backhaul:** The AMI report contains the assumption that existing SCL fiber will be used as a wide-area-network (WAN) to backhaul metering data collected by the AMI system to the AMI head-end server. The assumption required no additional fiber installation. A pilot of AMI technology is in process using, with success, the SCL fiber for backhaul purposes. No assessment has been made of the impact of pilot AMI data on the carrying capacity of existing fiber if, for FTTP purposes, portion of the capacity be made available to the telecommunications enterprise.
- **FTTP for AMI purposes:** A FTTP broadband solution was not part of the 2006 AMI report or the financial model supporting the report. Section 5, SCL Effects, contains supporting analysis that concludes FTTP for purposes of AMI will increase the cost of the SCL planned AMI. SCL, with City Council approval plans to go for bids on an AMI solution later in 2008. The results of the bid are expected to confirm the conclusions contained in Section 4.

2.4 Market Research and Penetration

- **Cable Television Market Size:** Due to the financial significance of the cable television market, its size needs to be better defined.
- **Cable Television Market Share:** The CCG Report forecasts that the new enterprise will capture 26 and 40 percent of the cable television market by years five and ten, respectively. It is the Project Team's opinion that such rates may be too optimistic and that follow-up analysis should be more conservative.
- **Market Research:** Available market research did not capture feedback about respondents' perceptions of incumbent providers, respondents' perceptions of the City and whether respondents currently have term-based contracts for telecommunications services. It is also not clear whether there are any issues beyond price that are important to respondents.

2.5 Business Operations

- **Organizational Structure:** The implications of the Okeson case may cause the new telecommunications enterprise to function as a completely independent entity. This assumption conflicts with notions that the telecommunications project would effectively be a new department within the City.
- **Competitive Response:** The new enterprise needs to develop a plan that identifies likely areas of competitive response and action plans to deal with each such response. Candidate areas include price competition, product differentiation through service bundles or legal/regulatory challenges.
- **Human Resources:** The new enterprise needs to develop a plan for hiring 137 to 190 FTE in the next five to ten years and integrating them into the new enterprise.

2.6 Pro Forma

- **Pro Forma Analysis:** Assuming that the new telecommunications enterprise operates as a stand-alone entity, there should actually be two pro forma under consideration; one for the City and one for the new enterprise. The City's pro forma would identify the incremental costs and benefits that result from leasing its assets to the new enterprise and purchasing telecommunications services from it. The pro forma for the new telecommunications enterprise would be generally similar to the one found in the CCG report.
- **Financial Risk:** Stakeholders need to be willing and able to accept the financial risks associated with launching a new business.
- **Cost of Debt Financing:** Pro forma analysis needs to be updated to simulate the cost of debt financing by an independent telecommunications entity.
- **Cable Television Revenues:** Pro forma analysis needs to include more conservative market penetration rates for cable television.

- **Pole Attachment:** Pro forma analysis needs to be updated to include the cost of pole attachments.
- **Revenue from Business Customers:** Forecasted revenues from the business segment needs to be justified.
- **Lost Revenue from Cable Television Franchise Fees:** Pro forma analysis needs to account for the City's loss of income from reductions in Comcast's franchise fee.
- **Cable Television Franchise Fee Expense:** Assuming that the Okeson decision requires the new enterprise to operate independently, then it is reasonable to assume that it will be required to pay the City a franchise fee in the same manner as other telecommunications service providers.
- **Cable Television Programming:** Pro forma analysis needs to reflect purchasing cable television programming from sources other than the National Cable Television Cooperative (NCTC).
- **Telecommunications Revenues from the City:** Assuming that the City would be an anchor tenant to the new enterprise, the City's pro forma should account for changes to its telecommunications expense for purchasing services, and, changes to its revenue for leasing existing assets to the new enterprise. Similarly, the new telecommunications enterprise would need to include revenues from the City and expense for leasing assets from the City.
- **Labor Overheads:** Pro forma analysis for the new enterprise needs to update labor overheads from 30 percent to 36 percent.
- **Labor Rates:** Pro forma analysis for the new enterprise needs to update labor rates to better reflect costs in the Seattle market.

2.7 Legal and Regulatory

- **Partnerships:** The CCG Report recommends that the City should partner with a third party that will build-out and operate the FTTP network. This approach is not feasible since (1) CCG was unable to identify any suitable third parties and (2) the Okeson decision may require the new telecommunications enterprise to operate independently from the City.
- **Rights-of-way and Easements:** The City's easements and rights-of-way need to be modified and approved to reflect the addition of telecommunications services.
- **North American Electric Reliability Council Rules:** The North American Electric Reliability Council (NERC) has established a set of rules that affect the new enterprise's access to the City's electric power assets. In particular, the new enterprise would not be able to locate its hubs or other equipment in most of the City's electric substations and network operations center (NOC). Available analysis assumes that telecommunications hubs will be located in 11 existing substations. Such analysis also assumes that the City's electric power NOC may

be used to locate a telecommunications operations center. This assumption is unlikely to be valid.

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Section 3

CRITICAL SUCCESS FACTORS

3.1 Introduction

There are a number of important factors that can improve the likelihood, but can not guarantee, a successful municipal telecommunications enterprise. These factors are presented below and are compared to the City's specific needs and objectives for a broadband network. The overall objective of this section is to guide the City in a manner that improves its chances for success.

3.2 Strategy

One of the most important factors that will affect the success of the overall enterprise is the City's need to create and communicate the vision, mission and objectives of the enterprise as well as a concise strategy that will guide the entire project. The Project Team concludes that the vision, mission and high level objectives are adequately described and can be extracted from the Task Force Report. The strategy to guide the project requires an entity to define the strategy and be charged with execution. The Project Team did not undertake to define this entity but has identified in this report some of the challenges to consider as the City defines this entity.

This strategy to execute will contain more specific quantifiable objectives and contain a number of attributes, including:

- **Objectives:** The City needs to establish a statement that consistently explains its reasons for pursuing this project. This should include no more than three to five of the City's most important objectives. Candidate objectives include (but are not mutually exclusive):
 - Create new sources of revenue for the City
 - Provide advanced services to constituents
 - Operate in a manner that avoids financial losses
 - Improve customer care
 - Provision telecommunications services that would not otherwise be offered
 - Achieve financial break even within a given amount of time
 - Improve the local quality of life
 - Promote economic development
 - Promote competition

- Combined billing with other services
 - Support local firms
 - Provision City services (e.g. building permits, property taxes, etc.)
- **Target Market:** Identify whom the City intends to serve. Candidate target markets include residences, small businesses, large businesses, schools, libraries, and government. These markets are not mutually exclusive.
- **Services:** Identify exactly which services will be provided. Candidate services include high-speed Internet, cable television, video on demand, high definition (digital) video, local voice, long-distance voice, automatic meter reading, and other utility applications.
- **Partnerships:** Identify the partnerships that would be necessary for the City to operate its new enterprise. Candidate partnerships include operating agents, billing/accounting agents, and maintenance contracts.
- **Coordinate Internal Resources:** A new telecommunications enterprise could impact a number of existing City departments, including Information Technology (IT), accounting, legal, and engineering.
- **Competitive Approach:** The enterprise created by the City must enter a competitive market with the same flexibility to conduct business as does the competition. Employee wage and benefit packages will be tailored to a new market and may require revision more frequently and dramatically than is the current practice within City departments such as SCL and others.

3.3 Technology

There are a number of technical factors that will directly impact the success of a new telecommunications enterprise.

- **Economics:** The network architecture should not be viewed as an end, but rather as a means to accomplishing the City's objectives. The City will need to determine the most cost effective approach to accomplishing its above stated strategy. Under-designing the network could result in near-term savings that would come at the cost of future expenditures. Alternatively, over-designing the network could result in higher near-term capital costs
- **Scaleable:** The new underlying network should have the ability to grow as the City's needs, services and markets expand over time.
- **Flexible:** The new network should be sufficiently adaptable to capture new opportunities. For example, in the event that a new large industrial
- **Proven Technology:** While the City may be interested in providing advanced state-of-the-art services, it may not be in a position to a technology leader. If this is the case, then the network should be built upon proven technologies that are well supported. There are important differences between "leading edge" and "bleeding edge" technologies.

3.4 Finance

There are a number of financial issues that directly impact the City's likelihood for success.

- **Pro Forma:** The new enterprise needs a candid forecast of its future financial health, and, a proactive plan that addresses potential shortcomings.
- **Debt:** The City will need to accurately predict its capital needs (CAPEX) for the new network. Near-term operating costs also need to be forecasted since debt may be structured to cover near-term financial losses.
- **Financial Risk:** The City will need to estimate the financial risks that are associated with the new enterprise. Financial risks stem from insufficient revenues to cover debt and operating costs. What financial losses can the City tolerate?
- **Patience:** It is common for new telecommunications enterprises to fail to earn a positive annual net income for a number of years. Maintaining financial patience during such initial years is necessary. The enterprise needs to have the financial backing to survive its initial years of financial losses.

3.5 Market Research

Market research should be utilized to achieve and maintain a keen understanding of customers' needs. Examples of critical information include the following:

- **Customers' Perceptions of the City:** The likelihood that customers will voluntarily purchase new telecommunications services from the City or a City affiliated entity is dependent, in part, on their perceptions of the City. It has been the Project Team's experience that perceptions are often founded on past interactions with the City on matters such as electric power or public works. Customers that have a positive perception of the City are more likely to purchase telecommunications services from the City than those that have a negative perception of the City. Market research is the preferred vehicle to understanding customers' perceptions of the City.
- **Customers' Perceptions of Incumbent Providers:** Above, it was noted that purchasing decisions would be affected by customers' perceptions of the City. Similarly, perceptions of incumbent service providers are also expected to be an important driver in the minds of customers. Customers that have a positive perception of their incumbent service providers are less likely to switch. Alternatively, customers that are dissatisfied with their current providers are more likely to switch, especially if they have a positive perception of the City.
- **Product Positioning:** Understanding customers' priorities and needs are fundamental to positioning telecommunications services. Market research should be used to determine what factors are most important to customers and the trade-offs that they are willing to accept. For example, customers may be interested in purchasing high-speed Internet service, but only at certain price points.

Purchasing additional bandwidth, even at a small incremental price, might not be well received. Consequently, it is imperative to use market research to test various bandwidth/price point combinations to assess customers' preferences.

3.6 Competitive Landscape

The competitive landscape is expected to directly impact the success of the new enterprise. Since Seattle's telecommunications market is relatively mature, the new enterprise is expected to capture market share at the expense of an incumbent. Consequently, competitive response is likely and the City must be prepared for various reactions. Typical examples of competitive response include the following:

- **Price Competition:** Incumbents might reduce prices in an effort to keep existing customers. This could result in a price war, where incumbents are generally better positioned than the City since they can realize profits elsewhere. Assuming that the City (or its affiliate) utilized entry pricing or followed prevailing price competition, then it is reasonable to assume that the City's financial outlook would be diminished.
- **Bundled Services:** Incumbents may be better suited than the City to bundle different telecommunications services. For example, available studies depict the City as offering voice, Internet and cable television services ("triple play"). In contrast, some incumbents may be able to offer these services and cellar telephone service ("quad play") at a discounted price. Consequently, the City might not be well positioned to compete in that environment. To resolve this issue, the City should research working with a cellar carrier to jointly offer such services.
- **Legal and Regulatory Hurdles:** Incumbents might challenge the legal or regulatory authority of the City to provide telecommunications services. In response, the City should proactively work through its existing legal channels to assess its support from the State Legislature prior to launching the new enterprise.

The City must be proactively prepared to respond to each or combinations of the above aspects of competitive response.

3.7 Monitor Legal and Regulatory Issues

Section 5 of this report finds that the most likely legal or regulatory obstacle might come from the implications of the Okeson case. This case suggests that the City might need to provision telecommunications services through a completely independent third party. Consequently, it is recommended that the City obtain a legal opinion on this issue prior to launching a new telecommunications enterprise.

4.1 Introduction

The Project Team made a high level assessment of SCL's participation in the telecommunications endeavor. SCL will intend to make its telecommunications assets available, wherever possible, to the new enterprise and subscribe to and serve as an anchor tenant to a telecommunications enterprise, wherever it is prudent to do so. The ability to make this intent a firm commitment requires a legal opinion in light of the Okeson decision. A firm commitment in advance of known circumstances regarding the enterprise requires a more in-depth review of existing purchasing policies and practices. Notwithstanding, the above, this section addresses how SCL may be impacted by FTTP opportunities.

These assumptions have a significant impact on the forecasted success of the new enterprise and this section reviews the advantages and disadvantages to SCL from possible options for participation. Factors to be considered include functionality, costs, risks, development time, implementation time, and license fees as well as potential effects on SCL's current business and strategic plans.

SCL is completing plans for a significant investment in AMI. A delay in these plans will delay the identified value of AMI to SCL and the citizens of Seattle.

4.2 Access to SCL's Assets

SCL's mission is to provide stable, competitively priced and environmentally sound electricity to its customers. To accomplish this mission within the regulatory requirements covered in other sections of this document, SCL must be independent of the new enterprise. SCL's business relationship with the new enterprise will need to be the same as its relationship with all other telecommunication providers. The sale to or access by the new enterprise to SCL assets will be under the same terms and conditions as apply to other entities (e.g. Qwest, Comcast, etc.). The Project Team did not review the comprehensive list of assets that SCL believes it could offer to a broadband telecommunications service provider. The Project Team understands that an asset list will be made available to all parties that choose to participate in the RFP process that is anticipated to occur in 2008. This view to providing assets or access to assets on a basis that does not impinge on SCL's ratepayers and on a fair and equitable basis to all RFP respondents including a new enterprise will not compromise the mission of SCL.

4.3 SCL Commitment to Purchase Services

SCL may be required by its policies and practices for competitive purchases to solicit a public bid for the acquisition of telecommunication services. Given the stated objective of the project to deliver services at a 20 percent discount from current competitive offerings, SCL is expected to be a subscriber to the new enterprise and be a source of revenue to it.

4.4 Financing

Section 5 of this report addresses the legal and regulatory issues that might impact the proposed telecommunications enterprise. That discussion finds that SCL might not be able to provide any initial or ongoing financial support to the new enterprise (see *Okeson v. City of Seattle*, 150 Wn.2d 540, 78 P.3d 1279). The new enterprise will need to secure debt financing at a rate that is likely to be higher than that obtained by municipal utilities.

4.5 Fiber Optic Applications in Municipal Utilities

The electric utility industry uses fiber optic networks where the speed of data is important and installation costs are generally manageable. Common examples include monitoring substations and large capacity metering points, supervisory control and data acquisition (SCADA), system protection and physical security. When fiber for communications with substations is available, a utility may provide video camera monitoring for security.

Fiber plays a role in generation, transmission and distribution system monitoring and automation. The speed of communications and constant status reporting is of high value. The cost of fiber installation has limited more widespread use of the technology in electric distribution systems. Utilities sometimes use a radio technology because of its lower cost and easier installation. Some utilities are using wireless technology rather than wired technology because of ease of installation and mobility issues. The proliferation of cell phones is a vivid reminder that mobility with respect to people and devices is important. The wireless industry continues to improve speed and reliability of connection to reduce those drawbacks.

4.6 AMI

It is possible to provide the benefits of AMI with a FTTP installation. In 2006, SCL evaluated the benefits of AMI and developed a plan to achieve AMI related benefits with a radio-AMI solution. Further in this section we discuss the higher capital cost to install an FTTP-AMI system. A reasonable question is whether AMI enabled by FTTP instead of radio provides a superior return to SCL even with the capital investment. The short-term answer is no, currently available radio-AMI technologies provide a return on investment to SCL higher than FTTP-AMI technology. The rest of this section contains the analysis that supports this conclusion.

4.6.1 Fiber to the Electric Meter - Three Options

Where utilities are considering AMI oriented fiber communications to each premise, there are three options currently available.

4.6.1.1 Direct connection of fiber to the meter

- This is a very expensive (\$250+/meter for metering hardware alone) solution. Comparable radio-AMI solutions are available for one-third to one-half the cost per meter. The Project Team is aware of one available solution through muNet on either a Sensus iCon meter or a GE i210 meter. The expense is due to the optical and conversion hardware that has to be included in the meter or in an adapter (collar) between the meter and socket. muNet does not encourage this solution due to the high cost per meter.

4.6.1.2 Meter connection via Ethernet connection to FTTP-box

- Normally fiber to the customer premises is brought into a FTTP-box (Optical Network Terminal or ONT) where the fiber-to-Ethernet conversion takes place at the premise⁴. Where an FTTP-box is installed at the customer premise, the preferred AMI solution is an Ethernet connection to the customer's local area network (LAN). This allows broadband communications and IP addressable solutions to the meter.
- While more expensive than radio-AMI this is a less expensive AMI solution than the direct fiber-to-the-meter option; volume cost is approximately \$100 per meter, including the meter but without a service switch.
 - a. muNet, an AMI provider, offers this meter on either a Sensus iCon or GE i210 meter.
 - b. Elster and Itron offer meters with an Ethernet connection however, currently, only on a more expensive commercial meter not economically practical for use with residential customers.

4.6.1.3 Meter connection via ZigBee to FTTP-box or IP Gateway

- Of the three FTTP-AMI alternatives this is likely the least costly.
- muNet, in recognition of the cost to install "hard wired" communications (fiber, cables) at the premise from the electric meter to the FTTP-box, has introduced a ZigBee communicating meter. A ZigBee communication board in the electric meter will communicate to a ZigBee board in the FTTP-box or an IP Gateway meter installed at the premise. ZigBee is a relatively short range (distance) radio mesh communications protocol gaining rapid acceptance in the AMI industry and

⁴ FTTP is a form of fiber-optic communication delivery in which an optical fiber is run directly onto the customers' premises. This contrasts with other fiber-optic communication delivery strategies such as fiber to the node (FTTN), fiber to the curb (FTTC), or hybrid fiber-coaxial (HFC), all of which depend upon more traditional methods such as copper wires or coaxial cable for "last mile" delivery.

with utilities considering deployment of AMI. The Project Team refers to this solution as ZigBee-FTTP-box.

- While ZigBee enabled meters deployed represent less than 1 percent of AMI meters there is a growing commitment from utilities to purchase this technology⁵. The ZigBee equipped FTTP-box will be in relatively close proximity to the ZigBee equipped meter to establish reliable communicate. If ZigBee-FTTP-boxes are not sufficiently dense (low penetration rates) then SCL will have two choices. One is, at SCL expense, to install ZigBee-FTTP-boxes in more locations and connect them to fiber. The second choice is to use a muNet IP Gateway meter connected to fiber and equipped to receive ZigBee communications from similarly equipped meters in local proximity. The uncertainty of penetration rates, meter proximity and ZigBee communication performance precludes estimating the cost of the ZigBee-FTTP-box solution. It will be more expensive than radio-AMI as evaluated in the 2006 AMI report.

4.6.2 An alternative to FTTP-box – radio communications to a collector with fiber (Ethernet) connected backhaul

- In each solution described above in 4.6.1, the installation expense per meter is higher than radio-AMI meter installation due to the need to run power from the meter to the ONT, ZigBee-FTTP-box or IP Gateway meter. The FTTP-AMI solution provider, muNet, offers a radio solution. A ZigBee equipped meter communicates to a radio equipped local area network (radio-LAN) collector. The LAN collectors can communicate meter data from and to multiple ZigBee-meters within radio range reducing FTTP-AMI installation expense because only the LAN must be connected to fiber. The radio-LAN communicates collected meter data via a fiber wide area network (WAN) to the central data site. Other radio-AMI providers have similar offerings to muNet. The muNet example is provided to demonstrate that the FTTP-AMI provider recognizes the higher cost of an FTTP-AMI solution and offers lower cost alternatives.
- The AMI system currently in pilot at SCL is an example of this alternative. Cellnet has a LAN collector described as a Take-Out-Point (TOP) that collects readings for several thousand end points. The TOP in the pilot is at the North Service Center with an Ethernet connection to the SCL fiber network.
- AMI vendors offering similar radio networks with a fiber-LAN collector include:
 - a. Cellnet
 - b. Eka Systems
 - c. Elster
 - d. Itron
 - e. muNet
 - f. Trilliant

⁵ Itron announced in a recent quarterly investor call a backlog of \$420 million in orders for its OpenWay technology. The Centron OpenWay meter is equipped with ZigBee communications.

4.6.3 Capital cost is higher for an AMI system based on FTTP

In the 2006 AMI Report, the projected capital cost to SCL for AMI in a system wide deployment was approximately \$59 million over 5 years. The financial model projected a positive net present value of approximately \$32.7 million. Capital projects at SCL are measured against Capital Investment Program (CIP) financial measures. In 2006 the radio-AMI system evaluated exceeded the required minimum for each CIP financial measure for a capital project⁶. As previously stated, the use of fiber for backhaul, described in Section 4.6.2, is included in the 2006 AMI analysis.

FTTP-AMI, in any of the forms described in 4.6.1, negatively affects the SCL 2006 AMI financial results summarized above. FTTP-AMI has two cost disadvantages compared to radio-AMI: a higher cost meter and higher AMI infrastructure installation cost. The total FTTP-AMI cost is highly dependent on the penetration rate of fiber installed at the expense of the telecommunications enterprise versus at SCL expense.

Where FTTP is available the cost to install an FTTP-AMI meter is higher than radio-AMI because of the labor necessary to make the hard-wired connection to the FTTP-box. Where FTTP is not available, SCL may need to install an FTTP-box at its expense. Similarly, installation of ZigBee equipped FTTP-box may be required at locations not in close proximity to the ZigBee equipped meter.

Higher Meter Cost

The average cost per residential single phase meter in the 2006 analysis was \$71. The anticipated cost of a fiber capable meter in similar volumes may be 30-40 percent higher⁷. The higher meter cost for an FTTP solution will likely increase the cost of AMI to SCL by approximately \$17 million (includes sales tax).

Higher AMI Infrastructure Installation Cost

The higher AMI infrastructure installation cost is a function of the FTTP penetration rate and with respect to the lowest cost FTTP-AMI solution, 4.6.1.3, the success of communicating meter data to the FTTP-box. The penetration rate for FTTP-boxes and the dispersion of FTTP-boxes in proximity to the meter transmitting via ZigBee to the FTTP-box will impact the success of AMI communications.

An assumed penetration rate does not help estimate the FTTP-AMI installation cost. As an example, one street may have 100 percent fiber penetration yet the meters on the opposite side of the street have 0 percent fiber penetration (an average of 50 percent in this example). The meters on the opposite side of the street might require SCL to install an FTTP-box at every other location (or more) to ensure meter communications. We cannot predict the dispersion of FTTP and we cannot predict whether every second premise or every third premise will provide adequate meter communications.

⁶ Advanced Metering Infrastructure (AMI) Value for City of Seattle, November 30, 2006, page 1.

⁷ There is additional cost to provide power estimated at more than \$50 per meter. These costs have not been included in this high level analysis. There may opportunities to reduce the \$50 cost. The point of the analysis, FTTP-AMI is more costly than radio-AMI is made using the lower estimate of meter cost.

Section 4

We have no empirical data available to determine the distance at which ZigBee will achieve acceptable success communicating in the specific radio environments of Seattle.

Given the unknowns of penetration rates, dispersion and ZigBee communication distances it is not possible to predict the CIP financial measures for FTTP-AMI. The Project Team instead assessed some boundary conditions where additional AMI infrastructure installation cost (in comparison to the 2006 radio-AMI total project cost) might be incurred by SCL and yet the AMI project still meet the CIP financial criteria.

Boundary condition of higher FTTP-AMI cost

Higher meter cost

Higher meter cost increases AMI system capital from approximately \$59 million to \$76 million. The net present value (NPV) of AMI (all other things being equal) over 15 years decreases from approximately \$32.7 million to \$17.0 million. The following table compares the CIP financial measures at both levels of capital expenditure.

Table 4-1
Capital Improvement Program (CIP) Evaluators, 2006 AMI versus FTTP

15 Years	IRR	3%	7%	10%
2006 AMI Report (\$59m)	11.1%			
NPV		\$32,666	\$12,269	\$2,710
Benefit/Cost Ratio		1.5	1.3	1.2
FTTP Impact (\$76m)	6.5%			
NPV		\$16,972	(\$1,781)	(\$10,280)
Benefit/Cost Ratio		1.2	1.0	1.0

While the NPV results are negative at discount rates of 7 percent and 10 percent, the \$76 million capital expenditure for FTTP-AMI meets the CIP financial criteria at the 3 percent discount rate and has acceptable CIP Benefit/Cost Ratios.

The higher FTTP-AMI meter cost does not by itself drop the SCL AMI project below the CIP financial measures required for project approval. The Project Team then asked, “At what level of capital expenditures are the CIP requirements not met?”

The answer is, when the capital cost of an FTTP-AMI project exceeds \$94.3 million. At \$94.3 million the NPV becomes negative at the 3 percent rate over the 15 year period. An additional \$18.3 million could be spent (tolerated) for an FTTP-AMI system and still meet the CIP criteria.

This result led the Project Team to ask, “How many FTTP installations can be made, if penetration rates, FTTP dispersion and ZigBee-FTTP-AMI communications performance require installation at SCL expense, within the CIP criteria?”

Additional FTTP installations

The cost to install FTTP to premises is assumed to be \$905 per aerial drop⁸. The \$18.3 million provides SCL the capability to install about 20,500 ZigBee-FTTP-boxes for supplemental coverage for AMI. While the number, 20,500 may seem like a lot of flexibility, it represents 5.3 percent of the total number of meters to be read.

Assuming the penetration for FTTP is slightly more than 40 percent and an additional 5 percent are installed at SCL expense we can roughly suggest that nearly one out of every two premises will have a direct FTTP-AMI connection. Communicating with the remaining meters is a function of the dispersion of the 50 percent and the communications performance of the ZigBee equipped AMI meters. The Project Team points out the risk that must be mitigated to ensure coverage for the remaining 50+ percent of the electric meters.

4.6.4 Additional AMI benefits from Fiber?

The preceding analysis of a Capital cost is higher for an AMI system based on FTTP. Does FTTP-AMI provide other AMI benefits that must be included?

An FTTP-AMI solution offers higher speed and data capacity when compared with the radio-AMI technology that served as the basis for the 2006 AMI Report. The higher speed and capacity however do not result in a materially larger monetary benefit.

The AMI benefits included in the model supporting the 2006 AMI Report are in the following table.

Table 4-2
Extract of AMI Benefits from 2006 AMI Report

AMI Benefit	Amount
Meter Reading - Labor, Expenses	\$ 2,648,935
Moves - New Accounts and Meter Sets (NAMS)	623,512
EBP - Validation	1,280,548
Account Control - Escrow Closing Bill	337,342
Distribution Operations - Tree Trimming	15,938
Faster Restoration after an Outage	8,530 *
Meter Accuracy	1,153,274
Meter Field Test	6,281
Lights Out Troubleshooting	40,520
Field Inspection of Failed MV-90 installation	540
Revenue Recovery - Tampering, Errors, etc.	1,959,603
Cash Flow Advance	977,477 *
Move-in, Move-out Call Processing	73,458
Hi Bill Inquiries	45,019
AMI Benefit Totals	\$ 9,170,977

The Project Team investigated where speed and volume might impact benefits. This investigation finds that no benefits will be negatively impacted by FTTP.

⁸ CCG quoted \$292 per aerial drop and \$613 per residential ONT = \$905. This assumes that the fiber infrastructure is installed from which the aerial drop will be made. Underground is more than \$905.

Two benefits; faster restoration after an outage and cash flow advance, will be larger with a FTTP-AMI system, but not significantly. These benefits are in the above table and have an asterisk next to them. Together the benefits represent about 10 percent of the total annual benefit.

- Faster restoration after an Outage. Data transmission speed and volume provided by FTTP, when integrated in near real time with an Outage Management System (OMS), will result in faster and more complete verification of power status. The annual benefit in the 2006 AMI Report was \$8,531. This value is so low it is not worth assessing the additional benefit we merely note that an increase is possible. (Perhaps SCL underestimated the value of restoration in the 2006 analysis but deriving a more accurate number is not part of this high level assessment nor is it likely to materially alter the conclusions or comparisons to radio-AMI which also will provide a proportion of the higher benefit.)
- Cash flow advance. This benefit will be larger with a FTTP-AMI system. FTTP-AMI will provide a meter reading at a time very near the close of the billing window because of the faster speed of data delivery. The cash flow improvement cannot exceed one day and the annual value of one day of cash flow based on the 2006 analysis is estimated at \$45,000 less than a 1 percent increase in total benefits.

About 90 percent of the benefits will be essentially the same whether the AMI system is FTTP or radio. The reasons are described below.

- Meter Reading Labor is dependent not on the speed of the reading but rather the availability of the reading. The expectation is that the radio-AMI system will have 99.8 percent of the readings available for billing. The FTTP-AMI system is assumed to have a similar performance.
- Moves, EBP, Account Control benefits are achieved when meter data is delivered within 60 seconds from the moment it is requested. Both FTTP and radio are faster than 60 seconds so the faster FTTP speed provides no additional benefit.
- Meter Accuracy results from the improved accuracy of the solid state meter not the supporting FTTP or radio technology.
- Energy Theft will be detected to the same extent by FTTP or radio and the speed with which a meter tamper is reported is a very small percent of the time to investigate and resolve the incident.

4.7 Additional Benefits of FTTP to SCL

In the 2006 AMI analysis, several potential distribution system benefits were identified as possible to be achieved through the proposed radio-AMI system. It is possible that fiber will provide a superior benefit to the anticipated benefit from an RADIO infrastructure. It must be noted that FTTP is not likely to provide the benefit but rather the use of fiber in general within the electric distribution system. The availability of a fiber network within the distribution system might be of value independent of the last hop to the premise to connect to the electric meter.

If a decision is made to further evaluate fiber technology then the following benefits ought to be examined for both fiber and radio infrastructures.

- SCADA - a preliminary estimate of \$3.4 million in reduced capital expenditures was expected through the use of radio infrastructure to replace a planned investment in fiber for SCADA controls in the south Lake Union and Denny Triangle service areas. At the time the use of the radio-AMI infrastructure was viewed as adequate in performance for lower cost. The fiber investment was not approved and the potential benefit of lower capital expenditure was not included in the 2006 AMI report. This can be examined more thoroughly,
- Distribution system capacitor bank controls – a preliminary investigation in 2006 identified nearly \$2 million dollars in capital savings by using the radio-AMI infrastructure. The value of capacitor bank controls might be further evaluated and the use of fiber or radio be part of that evaluation.
- Hazeltine system replacement – a preliminary analysis identified potentially \$1.2 million in net benefits replacing the current ageing Hazeltine system with radio infrastructure. This benefit will likely occur to the same or perhaps a greater extent using fiber.
- Outage benefits – the use of sectionalizers in an radio infrastructure will result in reduced outage times. The benefit was estimated at \$3.2 million based on the potential gain in business to commercial customers as a result of power being restored more quickly. This benefit will likely occur to the same or perhaps a greater extent using fiber.

4.7.1 Other considerations of FTTP-AMI or radio-AMI

- It is not clear to the Project Team who will pay the cost to communicate over fiber to the new enterprise. The fiber will be provided to the premise and the occupant will be responsible for the cost to communicate over the fiber (on a monthly fee or use basis). Will SCL pay a cost for meter reading or will that be provided free of charge? If SCL must install an FTTP-box where one isn't available will there be a monthly cost of the service and will it be paid by SCL to the new enterprise? Will the premise owner object to the installation of the FTTP-box?
- The ability to read water meters at a future date might be an issue with an FTTP-AMI solution. The use of ZigBee must be assumed; certainly fiber will not be run to the water meter. There is currently no water meter that communicates its readings using ZigBee. We do not see any technology impediments to the industry creating a ZigBee water solution. One difficult technical issue will be the distance at which ZigBee can communicate.
- Currently one AMI vendors offers FTTP-AMI, muNet. The price of FTTP-AMI meters is higher than that of radio-AMI solutions. Millions more radio-AMI meters are sold annually than FTTP-AMI meters and this is unlikely to change. The economies of scale will likely widen the price gap between radio-AMI and FTTP-AMI meters.

- Service switches are becoming viewed as a standard feature of radio-AMI meters. All meter manufacturers offer a service switch integrated into solid state radio-AMI meters. No meter manufacturer currently provides a service switch in a FTTP-AMI meter. There is no known impediment to integrating the technology merely a lack of market demand.
- IP connectivity is an advantage with FTTP-AMI. In the radio-AMI market, only SilverSpring Networks currently has a competitive IP offering.
- The 2006 AMI Report and based its expected CIP financial measures on a five year implementation of radio-AMI. It will be important that the installation of a fiber network and the use FTTP-AMI not result in a delay in the proposed 5 year implementation. The 2006 AMI Report estimated that a one year delay in deployment will have a negative \$6.7 million impact on the net present value of the AMI project. SCL is currently evaluating a three or four year AMI implementation rather than five.

4.7.2 AMI conclusion regarding fiber

FTTP-AMI is more expensive than radio-AMI. Chelan County PUD was one example provided in the CCG report of a utility implementing FTTP. It is important to note that while Chelan is deploying FTTP and expects to complete its FTTP installation in 2012 it does not plan to use FTTP for AMI purposes. The Okeson decision arises as a concern of the Project Team. Is the choice of a more expensive FTTP-AMI solution without supported additional benefits a cross-subsidization of the fiber and telecommunications project?

4.8 Additional SCL Benefits - SCADA and System Protection

The preceding discussion focused only on the AMI related benefits to SCL. In addition to AMI, there are two additional areas where the new enterprise might positively impact SCL; SCADA and system protection.

While an assessment of SCL's SCADA and protection systems are outside of the scope of this report, it generally appears to be well suited to meeting SCL's anticipated needs. SCL's SCADA system facilitates a prudently high-speed data path between its operations center and key substations. The Project Team assumes that the primary focus of SCL's operations center and SCADA are on its generation and transmission operations, and not on the distribution system. This outlook is commonly true throughout the electric utility industry. However, looking long-term, SCL may become increasingly interested in deploying distribution automation. If such advances occur, then SCL will benefit from having access to a high speed path that reaches deeper into its distribution than what is currently available.

Section 5

LEGAL AND REGULATORY REVIEW

5.1 Introduction

It is important to perform an examination of various statutes and laws that could affect the degree of SCL participation, including:

- Federal
- Washington State
- City of Seattle
- Right-of-Way Easements
- North American Electric Reliability Council
- Federal Energy Regulatory Commission
- Homeland Security

The observations and recommendations contained here are intended to provide the City with a high level analysis and do not constitute a legal opinion. It must also be noted that this review reflects the current status of pertinent laws and regulations and that future laws and regulations could affect this analysis.

5.2 Federal

The Telecommunications Act of 1996 (Act) represented a major overhaul of the 1934 Telecommunications Act. One important goal of the Act was to remove barriers to entry to provisioning telecommunications services and encourage competition throughout the United States. Initially, the primary focus for new entrants was on local and long distance voice services. Though, later, Internet and cable television became even more important. Numerous municipalities, public utility districts (PUD) and investor owned utilities responded to the Act by launching their own telecommunications ventures, including several in the State of Washington (e.g. City of Tacoma, Grant County PUD, Chelan County PUD, etc.).

From the perspective of states and municipalities, one of most controversial components of the Act may be found in 47 U.S.C. § 253(a), where it states,

“No State or local statute or regulation, or other State or local legal requirement, may prohibit or have the effect of prohibiting the ability of **any entity** to provide any interstate or intrastate telecommunications service.”
(Emphasis added)

This reference to “any entity” later became the source of continued debate and litigation. Several years after the passage of the Act, Missouri Statutes Section 392.410(7) banned political subdivisions (e.g. towns, counties, local governments, etc.) from offering telecommunications services, stating,

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

Various municipalities and municipal organizations, including the American Public Power Association (APPA), filed a petition with the Federal Communications Commission (FCC) to preempt the Missouri statute for being in violation of the Act. The FCC denied this request and the matter was later heard by the United Supreme Court under three consolidated petitions (*Nixon v. Missouri Municipal League* (S. C. No. 02-1238), *FCC v. Missouri Municipal League* (S.C. No. 02-1386) and *Southwestern Bell v. Missouri Municipal League* (S.C. No. 02-1405). On March 24, 2004, the United States Supreme Court issued its opinion that states do have the authority to limit or prohibit political subdivisions from provisioning telecommunications services.

Whereas there are currently no Federal laws that limit or prohibit SCL from provisioning telecommunications services, the authority to enact such provisions currently lies with the state of Washington.

5.3 Washington State

In Washington, public utility districts (PUD) are prohibited from providing retail telecommunications services, but may provide wholesale services. In its high level review of telecommunications laws in Washington State and conversations with the Washington Utilities and Transportation Commission, the Project Team did not find any statutes or regulations that prohibit the City from provisioning of long-distance or local voice services. Furthermore, Washington does not regulate Internet or cable television services.

There is one important statute that would influence the financial operations and performance of the City’s proposed telecommunications enterprise. In 2003, the Washington State Supreme Court ruled that the City had misused funds by transferring the responsibility for paying for street lights from general taxpayers to SCL ratepayers (see *Okeson v. City of Seattle*, 150 Wn.2d 540, 78 P.3d 1279). It is the Project Team’s non-legal opinion that the implications of this ruling on the proposed telecommunications enterprise include the following.

- Cross subsidies between the City and the proposed telecommunications enterprise are disallowed.
- The telecommunications enterprise would need to generate sufficient revenue to support itself.

- The telecommunications enterprise would not be able to receive any financial support from SCL ratepayers or the City's general taxpayers. The Project Team interprets this to mean that, within the boundaries of sound judgment, SCL can pay no more for fiber services that provide a benefit than SCL would pay for the benefit from an alternative technology.
- The proposed telecommunications enterprise would be required to pay the City for the use of its assets (e.g. staff, pole attachments, substations, etc.).

5.4 City of Seattle

The Project Team contacted the City's legal staff in order to determine whether the City's charter contains any provisions that address the launch of a new telecommunications enterprise. Based on verbal feedback provided by City staff, the Project Team is not aware of any City oriented rules or regulations that inhibit the proposed telecommunications enterprise.

5.5 Right-of-Way Easements

SCL has numerous easements that identify the specific utilities that have access to each right-of-way. The Project Team has assumed that such easements do not specifically identify the City's access for the purposes of provisioning telecommunications services. Consequently, a large number of the City's existing rights-of-way and easements might require revisions and new approvals. If this assumption turns out to be valid, then the City would need to undertake a significant effort to perfect rights-of-way easements.

5.6 North American Electric Reliability Council

The North American Electric Reliability Council (NERC) has established a set of rules that, among other things, mandate the adoption of certain procedures which address the cyber and physical security of SCL's critical assets. It must be noted that most of NERC's rules are relatively new and that specific interpretations are on-going. NERC is also expected to issue additional rules in the future. The following discussion presents the pertinent existing rules that are expected to impact the proposed new telecommunications enterprise.

- CIP-002-1 (Cyber Security – Critical Cyber Asset Identification): Requires SCL to identify and document its Critical Cyber Assets that support the reliable operation of its bulk electric system. Such assets include several of SCL's substations and control room. At this point in time, it appears that fiber optic cables, which are located in rights-of-way, are not considered to be a Critical Cyber Asset. However, in light of the fact that such fibers carry information that is critical to SCL's daily operation (e.g. SCADA, EMS, system protection, etc.) it is possible that future NERC rules might modify this observation. This rule

requires SCL to protect its Critical Cyber Assets in a manner that makes them inaccessible to unauthorized personnel.

- CIP-004-1 (Cyber Security – Personnel & Training): Requires personnel that have authorized cyber or authorized unescorted physical access to Critical Cyber Assets have the appropriate level of risk assessment, training and security awareness.
- CIP-005 (Cyber Security – Electronic Security Perimeters): This rule requires the identification and protection of the Electronic Security perimeters that contain SCL’s Critical Cyber Assets.
- CIP006 (Cyber Security - Physical Security of Critical Cyber Assets): Critical Cyber Assets are required to be addressed in a Physical Security Program. This program would ensure that all Critical Cyber Assets that reside within an Electronic Security Perimeter would also reside within a Physical Security Perimeter. The Physical Security Perimeter is completely enclosed in a “six-wall” border and would address all access points, monitor physical access, define access authorization procedures and escorting of non-authorized personnel.

The above NERC criteria are expected to adversely impact the proposed telecommunications business in a number of ways. Operating and maintaining the proposed business would require the City to hire additional field crews that are telecommunications specialists. It is also expected that such crews would not have adequate prior experience in working with electric power equipment. It is essential that telecommunications crews have “7/24” access to all of the components of the telecommunications network. In order to comply with the above NERC criteria, apparent conflicts could be resolved in one of two ways: (1) train all telecommunications field crews so that they can work in electric substations or (2) construct new telecommunications hubs outside of the fence of existing substations.⁹ While the second option is probably more feasible, it raises a new set of concerns: (1) existing substations apparently do not have sufficient available adjacent land for new hubs and (2) constructing a new building to contain a hub would increase the capital cost of the network.

The NERC criteria would also preclude the new business’ future network operations center (NOC) from being located within the City’s electric operations center. Consequently, the NOC would need to be located outside of the City’s existing substations and buildings.

5.7 Federal Energy Regulatory Commission

The Federal Energy Regulatory Commission (FERC) has granted NERC with the authority to set forward a series of rules that govern the security of electric utility assets. The implications of such rules on the new telecommunications enterprise is discussed above.

⁹ This would pertain only to those substations that have been identified as being a Critical Cyber Asset.

5.8 Homeland Security and Federal Emergency Management Agency

The Project Team's preliminary analysis has not discovered any concerns that are founded on Homeland Security or the Federal Emergency Management Agency (FEMA). However, the new enterprise would need to facilitate "911" emergency services.

5.9 Additional Considerations

The Project Team did not review the City and SCL charters to determine whether there are any provisions that could impact the creation of a telecommunications enterprise or the provisioning of services. It is recommended that the City's in-house council conduct such reviews prior to deploying the project.

As noted above, this review and analysis does not constitute a legal opinion.

DRAFT