MINUTES OF THE TWENTIETH MEETING

REGIONAL TELECOMMUNICATIONS PLANNING ADVISORY COMMITTEE (Reconstituted)

DATE: August 7, 2007

TIME: 2:00 P.M.

PLACE: Commissioners' Conference Room
Regional Planning Commission Offices
W239 N1812 Rockwood Drive
Waukesha, Wisconsin

Members Present

Kurt W. Bauer Chairman	Executive Director Emeritus, SEWRPC
William R. Drew Vice Chairman	Vice-Chairman, SEWRPC; Executive Director, Milwaukee County Research Park
Bob Chernow	Chairman, Regional Telecommunications Commission
David L. DeAngelis	Village Manager, Village of Elm Grove
Barry Gatz	Network Supervisor, CenturyTel
Michael E. Klasen	Director, Regulatory Affairs, AT&T
George E. Melcher	Director, Office of Planning and Development, Kenosha County
Rob N. Richardson	Director, Racine County Information Systems
Steven L. Ritt	Attorney at Law, Michael Best & Friedrich
Dale R. Shaver	Director, Waukesha County Department of Parks and Land Use
Gustav W. Wirth, Jr.	SEWRPC Commissioner
Darryl Winston	Director of Data Services, City of Milwaukee Police Department

Members Absent

Roger Caron	President, Racine Area Manufacturers and Commerce
Michael Falaschi	President, Wisconsin Internet
Jeff M. Lowney	Vice President/General Manager, Time Warner Telecom
Michael Long	Attorney-at-Law, Murn and Martin, SC
Jeff Mantes	Commissioner of Public Works, City of Milwaukee
Paul E. Mueller	Administrator, Washington County Planning and Parks Department
James W. Romlein	Managing Director, MVLabs, LLC
Bennett Schliesman	Director, Kenosha County Emergency Management /Homeland Security
Michael Ulicki	Vice President and Chief Technology Officer, Norlight Telecommunications

Staff

Kenneth J. Schlager, PhD	Chief Telecommunications Engineer, SEWRPC
Lynn G. Heis	Staff Secretary, SEWRPC

CALL TO ORDER AND ROLL CALL

Chairman Bauer called the meeting to order at 2:00P.M. Roll call was taken by circulating an attendance signature sheet, and a quorum was declared present.

CONSIDERATION OF THE MINUTES OF THE MEETING OF JUNE 5, 2007

Chairman Bauer noted that copies of the minutes of the nineteenth meeting of the Reconstituted Regional Telecommunications Planning Advisory Committee held on June 5, 2007, had been distributed to all members of the Committee for review prior to the meeting. He asked the Committee to consider approval. He noted that these minutes documented the results of the Committee review and conditional approval of pages 29 through 49 of Chapter VII "Design and Evaluation of Alternative Regional Broadband Telecommunications Plans" of SEWRPC Planning Report No. 53, *A Regional Broadband Telecommunications Plan for Southeastern Wisconsin.*

Mr. Chernow noted that in the Committee's discussion concerning the cost structure of the Fiber-to-the-Node (FTTN) alternative plan, as that plan was described in the preliminary draft of Chapter VII of SEWRPC Planning Report No. 53, he had indicated that, in his opinion, the cost structure used was incomplete because it did not include customer service acquisition costs and he had suggested that such costs be estimated and included in the cost structure for all of the alternative plans considered. Although this suggestion was not, upon discussion, adopted by the Committee, he would ask that that part of the discussion relating to AT&T's proposed service charges for high speed fiber-to-the-node system service be noted as an insert to page 3 of the minutes. In that discussion Mr. Chernow said Mr. Klasen had agreed that the initial service charge of about $100 per month was, in effect, an introductory or promotional, service charge, and could be expected to increase over time to perhaps as high as $145 per month.

There being no further corrections or additions, on a motion by Mr. Wirth, seconded by Mr. Chernow, and carried unanimously, the minutes of the meeting of June 5, 2007, were approved as expanded.

CONSIDERATION OF PRELIMINARY DRAFT OF CHAPTER VIII "ALTERNATIVE PLAN COMPARISON AND EVALUATION AND SELECTION OF A RECOMMENDED PLAN" OF SEWRPC PLANNING REPORT NO. 53, *A REGIONAL BROADBAND TELECOMMUNICATIONS PLAN FOR SOUTHEASTERN WISCONSIN.*

Chairman Bauer noted that a copy of the preliminary draft of Chapter VIII "Alternative Plan Comparison and Evaluation and Selection of a Recommended Plan" of SEWRPC Planning Report No. 53, *A Regional Broadband Telecommunications Plan for Southeastern Wisconsin* had been provided to all members of the Committee for review prior to the meeting. Chairman Bauer then asked Dr. Schlager to undertake a review of the draft with the Committee. The following comments were made, questions were raised, and actions were taken in the course of the review.

Mr. Klasen called attention to the rank order of the objectives and supporting standards as set forth on page 3 of the Chapter. He indicated that he disagreed with the rank ordering of performance as second to universal geographic coverage; and expressed the opinion that the rank order of these first two objectives should be reversed. A lengthy discussion ensued in which Mr. Klasen argued that performance should be given the highest rank since the Commission had undertaken the telecommunications planning effort to identify the means by which high-speed broadband telecommunications service could be best provided within the Region in order to maintain the economic competitiveness of the Region with other regions of the nation and the world. Mr. Chernow agreed with Mr. Klasen as did Mr. DeAngelis who expressed the opinion universal geographic coverage was meaningless if the service provided was poor.

Captain Winston disagreed with Mr. Klasen, indicating that universal coverage was an important concern, especially with respect to minority communities within the Region.

Mr. Ritt also agreed with Mr. Klasen indicating that, although in his opinion, the rank order of these first two objectives was a difficult call, changing the order as suggested by Mr. Klasen should not do any great violence to the plan selection process since universal geographic coverage would remain as second in rank of the six objectives concerned.

Chairman Bauer indicated that it was the prerogative of the Committee to change the rank order of the objectives, and suggested that since there appeared to be some difference of opinion among the Committee members concerning the rank order of the first two objectives, the issue could best be resolved by a Committee vote.

Mr. Klasen then moved that the rank order of the first two objectives as set forth on page 3 of the text be reversed to give performance the highest rank order and universal geographic coverage the second. The motion was seconded by Mr. Chernow. Following further discussion, the motion was approved with Messrs. Chernow, DeAngelis, Drew, Gatz, Klasen, Melcher, Richardson, Ritt and Shaver voting "aye" and Messrs. Winston and Wirth voting "no."

Chairman Bauer observed that based upon this action, staff would have to reapply the rank-based expected value method of plan evaluation, and would have to revise the Chapter based upon the outcome of that reapplication.

Mr. Klasen called attention to the third sentence in the last paragraph on page 5 and suggested that the sentence be rewritten to note not only the percentage of the total area of the Region covered by both the Fiber-to-the-Node and Fiber-to-the Premises (FTTP) alternative plans, but also the percentage of the resident population and commercial and industrial land uses served as was done in Chapter VII of the report. The Committee concurred.

[Secretary's Note: The third sentence of the last paragraph on page 5 was revised to read as follows:

"The Fiber-to-the-Node (FTTN) and Fiber-to-the-Premises (FTTP) wireless alternative plan would serve about 36 percent of the total area of the Region and, therefore, cannot achieve high rank for geographic coverage. Those alternative plans may, however, be expected to serve about 92 percent of the anticipated year 2035 resident population of the Region; about 93 percent of the land anticipated to be devoted to commercial use within the Region; and about 90 percent of the land anticipated to be devoted to industrial use within the Region in that year."]

Mr. Richardson called attention to the text of the first partial paragraph on page 6 which, in his opinion, gave the impression that a high demand for high-speed broadband telecommunications services should not be expected from low density rural areas, and observed that his experience indicated that a high level of demand can indeed be expected in such areas. Dr. Schlager agreed with Mr. Richardson, indicating that this too, was the Commission staff's experience. The Committee concurred that the text concerned should be revised to correct the possibility of misinterpretation in this respect.

[Secretary's Note: The following sentence was inserted between the first and second full sentences of the first partial paragraph on page 6:

"This potential lack of capital funding should not, however, be interpreted as indicating that there would be little demand for high-speed broadband telecommunications services in low density rural areas of the Region: experience has indicated the opposite to be true."]

Mr. Klasen called attention to the information presented on page 6 concerning the infrastructure cost objective. He noted that the operating costs for the Community-Based Wireless and the Regional Wireless alternative plan were substantial, and indicated that, in his opinion, these costs should be reflected in the information presented. He noted that those costs were presented in Chapter VIII and had been discussed at some length and approved by the Committee. A lengthy discussion ensued in which Chairman Bauer indicated that the operation costs for the four alternative plans could be presented on page 6; and that the comparative evaluation of the alternative plans could be accomplished based upon both capital and operating costs by calculation of the present worth of each alternative as is done in public works systems planning.

[Secretary's Note: The data presented for infrastructure cost objective on pages 7 and 8 of the Chapter have been revised to provide operating as well as capital costs for each of the alternative wireless plans together with the present worth of each wireless plan. The present worth values were calculated utilizing a 10 year period of amortization and a five percent interest rate. The additional data are presented in the draft of Chapter VIII attached to these minutes. In addition, text was added to pages 7 and 8 of the Chapter to describe the concept of, and the assumptions made in, the computation of the present worth values used to facilitate the comparative evaluation of alternative plans based upon both capital and operating costs.

"**Infrastructure Cost Objective**
Two methods were used to determine the infrastructure costs of the alternative plans. The first set of infrastructure costs was limited to the actual costs of the infrastructure equipment with no provision for operating costs. The second method included the capital costs of the first method plus the present value of that portion of the operating costs representing capital substitution costs, i.e. the incrementally higher Internet access costs resulting from the purchase of Internet access locally at each antenna site rather than regionally based on a fiber optic cable backhaul network allowing for lower Internet access costs.

Ranking of the alternative plans on the infrastructure cost minimization objective was *also* accomplished on the basis of the infrastructure costs plus the present value of any higher operating costs resulting from the avoidance of increased fiber infrastructure costs that would result in lower operating ~~costs~~ *rates*. The basic direct Internet access rate for the 141 base station sites of the Regional Wireless Plan and the 54 backhaul stations of the Community Wireless Plan is $70 per megabit per second per month. If additional fiber optic infrastructure were installed allowing for high volume Internet connections in the 5 gigabit per second range at only three connections, the Internet access rate would drop to $45 per megabit per second per month. The $25 per month difference in the two rates was then

capitalized based on the present value of the payments over a ten year period at 5% interest rate. The modified infrastructure costs using the second method change only for the two wireless plans. The wireline plans are assumed to have no substituted capital costs in their operating costs. Under the second method, the modified infrastructure costs were estimated as follows:

1. Community-based Wireless Plan – $38.6 million
2. Regional Wireless Plan – $39.1 million
3. Fiber-to-the-Node Wireline Plan – $77.7 million
4. Fiber-to-the-Premises Wireline Plan – $246.0 million

The above infrastructure costs do not allow for the public safety/private commercial infrastructure cost sharing that is an integral part of the Regional Wireless Plan. This cost sharing will significantly reduce the infrastructure cost of the Regional Wireless Plan, again making it the lowest cost plan alternative. Based on considering both methods of infrastructure costing, the plans were ranked as follows:"]

Mr. Ritt indicated that given the importance of the Chapter, the source of the capital and operating costs concerned should be given. The Committee concurred.

[Secretary's Note: The source of the capital and operating costs for the various alternative plans considered is set forth in the text added to page 4 concerning the calculation of present worth values.

"All cost estimates here are based on the detailed cost breakdowns developed in Chapter VII which included wireless infrastructure costs in Table 2 and wireless operating costs in Table 3. Wireline cost estimation methodology is covered in the text for each plan alternative."]

Mr. Richardson indicated that it would be helpful to include information on the costs of each alternative plan to the end user expressed as a monthly service charge. Dr. Schlager noted that this information had been provided in the initial draft of Chapter VII, and that the Committee had, after extensive discussion, directed the staff to remove such costs from the Chapter and from the report.

Mr. Klasen called attention to the text on page 10 and suggested that the phrases "based underground" and "generally above-ground" be struck from the penultimate sentence of the first partial paragraph on that page. The Committee concurred.

Mr. Ritt called attention to the text on page 12 in which the probability of implementation of the Regional Wireless Plan is given as 60 percent; the justification for the selection of this value being given in two brief sentences. He suggested, and the Committee concurred, that the text be expanded to describe the Kenosha County demonstration project concerned and its current status.

[Secretary's Note: The following text has been added to page 12:

"The Kenosha County joint public safety/WiFiA wireless communications demonstration project is currently at the contract closure stage and is scheduled to begin in September, 2007. The project activities will include a detailed 4.9GHz (public safety) and 5.8 GHz (commercial WiFiA) plan

followed by a field demonstration of long-range, high-performance at 4.9 GHz communications with law enforcement vehicles. The project will also include a demonstration of peer-to-peer backup communications for public safety that would provide for network continuity when infrastructure is damaged in major public emergencies. If the field demonstration project is successful, Kenosha County intends to implement an early broadband public safety communications safety deployment that is county-wide in coverage."]

Mr. Klasen distributed a series of tables illustrating possible revisions to the application of the rank-based expected value method of alternative plan evaluation, (copies attached to these minutes.) He noted that, the first page of tables simply presented the application of the method as carried out by the staff and identified the Regional Wireless Plan as the best alternative plan. The second page of tables, he said, reflected a revised application of methodology; the changes from the values presentation first page being highlighted in blue; these changes included the change in the rank ordering of the objectives agreed upon earlier in the meeting. He noted that the tables on the second page also reflected the inclusion of operating as well as capital costs in the explanation. He noted this reanalysis indicated that the Regional Wireless Plan and the Fiber-to-the-Node plan ranked about equally, both with a rating of 39. Mr. Klasen further noted that the Community-Based Wireless Plan carries an extra burden of having to obtain commitments to implementations from 147 local municipalities, therefore, he said, the third page of tables reflects the application of the method considering only three of the alternative plans considered – the Regional Wireless, FTTN, and FTTP plans. Under this application the FTTN plan would rank slightly higher, he said, than the Regional Wireless Plan.

Mr. Klasen concluded his presentation by indicating he supported the use of the methodology, but was of the opinion that the report should not conclude that the Regional Wireless Plan is the preferred plan, but that the two plans, the Regional Wireless Plan and the FTTN rank almost equally.

Chairman Bauer thanked Mr. Klasen for his thoughtful analysis. He noted that the preliminary draft of the Chapter indicated that even though the Regional Wireless Plan may have ranked highest in the initial application of the methodology, other considerations required flexibility in the structure of the plan, recognizing importantly, that AT&T had begun the deployment of a FTTN wireline network within the Region. He noted that it had been agreed that the staff would redo the application of the methodology based upon the change in the ranking of the first two objectives, and the inclusion in the calculations of operating as well as capital costs and of present worth values for each of the alternatives considered. He noted that the staff would have to redo the application and redraft the Chapter to determine the affects of these major changes.

Mr. Klasen indicated that the revised Chapter should reflect the fact that the planning effort should recognize that all of the technologies concerned have importance in meeting the telecommunications needs of the Region.

Mr. Chernow questioned the ranking of the two systems considered for the provision of mobile broadband wireless service in that the performance of at least one of the two technologies was questionable. A lengthy discussion ensued concerning the relative state of development and performance of the WiMAX technology, upon the conclusion of which it was the consensus of the Committee that the text should not be changed with respect to the presentation concerning these two systems.

There being no further questions or comments, and upon some further discussion, it was agreed that the staff would revise Chapter VIII in accordance with the Committee's direction and present a revised draft for Committee review and consideration of approval at its next meeting.

NEW BUSINESS AND CORRESPONDENCE

Chairman Bauer indicated that the staff was in receipt of an electronic communication from Mr. Falaschi who was not able to attend this meeting, (copy attached). Chairman Bauer noted that in the communication, Mr. Falaschi disagreed with the identification of the preferred plan as set forth in the Chapter. He noted that Mr. Falaschi would hopefully be present at the next meeting when this matter was to be reconsidered, and could then participate in the review of the revised Chapter VIII.

DATE AND TIME OF NEXT MEETING

There being no further business to consider, Chairman Bauer then asked the Committee to consider the date and time for the next Committee meeting. After brief discussion, it was agreed that the next meeting of the Committee would be held on Tuesday, October 2, 2007 at the Commission offices beginning at 2:00PM. The agenda items would include the review and action on a revised draft of Chapter VIII; Chapter IX dealing with plan implementation; and Chapter X a summary of the entire report.

ADJOURNMENT

There being no further business to come before the Committee, on a motion by Mr. Wirth, seconded by Mr. Chernow, and carried unanimously, the meeting was adjourned at 4:30 PM.

Respectfully Submitted,

Lynn G. Heis
Committee Secretary

KWB/lgh
10/17/07
#129553 V1 - T/C Minutes 20th Meeting

Chapter VIII

ALTERNATIVE PLAN COMPARISON AND EVALUATION AND SELECTION OF A RECOMMENDED PLAN

INTRODUCTION

The previous chapter of this report described a set of alternative wireless or wireline broadband telecommunications plans that alone, or in combination, were candidates for a recommended comprehensive, regional telecommunications plan for Southeastern Wisconsin. This chapter presents the findings of a comparative evaluation of these alternative plans; and based upon these findings sets forth a recommended plan. The plan selection process looks back to Chapter III of this report which defines the objectives, principles and standards that are intended to serve as the basis for the comparative evaluation of the various alternative and adjunct plans considered, and for selecting one of these alternative plans, or combination of these plans, as the preferred plan for future broadband telecommunications within the Region.

METHOD OF EVALUATION

In the preparation of long range public works facilities plans, the Commission usually uses the benefit-cost analysis method for the comparative evaluation of alternative plans. Although this method may be theoretically applicable to the shorter range alternative telecommunication system plans presented in this report, the method loses much of its effectiveness in such application because of the following limitations:

1. It is impractical to assign a monetary value to the many intangible benefits and costs attendant to telecommunication system development within the Region, and it is extremely difficult to assign monetary values to even the direct benefits and costs associated with such development.

2. Because of the relatively greater uncertainty associated with implementation of a regional telecommunications plan, there can be no assurance that the potential benefits will ever be realized, even though some of the costs associated with the development of a given system may, nevertheless, be incurred.

It was determined that the alternative telecommunication system plans considered would be compared by scaling each plan against each development objective set forth in Chapter III of this report, utilizing the standards supporting each objective and the results evaluated by the Regional Telecommunications Advisory Committee. In addition, the comparative evaluation was supplemented by the application of a method which seeks to assign a value to each alternative plan.

The method chosen, overcomes, to a considerable extent, the difficulties inherent in the application of benefit-cost analysis to telecommunication system planning. The method is an adaptation of the rank-based expected value method used for corporate and military decision making.[1,2,3,4] This method avoids the difficulties associated with the assignment of monetary values to potential benefits and costs associated with the alternative plans by limiting the plan evaluation problem to one of rank ordering each alternative under each of the stated development objectives. It is usually easier to rank order the perceived effectiveness of a given plan in achieving a given development objectives than it is to attempt to assign monetary values to the benefits accruing to the attainment of the objective.

The difficult problems associated with uncertainty of plan implementation are also ranked in the chosen method of plan evaluation through the medium of probability estimation. Some alternative plans, while theoretically highly desirable, may have a low probability of implementation; and, in the application of the method, such plans are assigned a lower value for probability of implementation. Other plans, while theoretically less desirable on the basis of the ability to attain stated objectives, may have higher actual value because of a greater likelihood of implementation.

In plan evaluation, then, the application of the rank-based expected value method involves the following sequence of activities.

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[1] C. H. Igor Ansoff, Corporate Strategy, McGraw-Hill, New York, N.Y., 1965.
[2] K. J. Schlager, "The Community-The Rank-Based Expected Value Method of Plan Evaluation," Highway Research Board, 1968.
[3] Z. Hu, et al., "Fuzzy Expected Value model for Transmission Planning with Hybrid Intelligent Algorithm," Computers and Advanced Technology in Education Conference, October 8-10, 2007, Beijing, China.
[4] Yian-Kui Liu and Baoding Liu, Information Sciences, Volume 155, Issues 1-2, 1 October 2003, Pages 89-102.

1. All specific development objectives, n in number, are ranked in order of importance to the agreed upon development objectives and assigned "weight" of n, n minus 1, n minus 2, and so on to n minus one (n-1) in descending rank order.

2. The alternative plans, m in number, are ranked under each of the specific development objectives and assigned a "score" of m, m minus 1, m minus 2, and so on to m minus one (m-1) in descending rank order.

3. A probability, p, of plan implementation is assigned to each of the plans being ranked.

4. The value, V, of each alternative plan is then determined by summing the products of n times m times p for each of the specific development objectives, or:
   $V = p \Sigma (n_1 m_1 + n_2 m_2 + \ldots + n_n m_n)$

In Chapter III of this report, specific telecommunication system development objectives were expanded into sets of supporting standards which could be used to evaluate the ability of an alternative plan to achieve a given specific development objective. Any ranking of an alternative plan for a given specific development objective must, therefore, be consistent with the ability of the plan to achieve the supporting standards set forth for that objective. To achieve this consistency, it is necessary to compute a value for each of the alternative plans according to the supporting standards set forth for each development objective before arriving at an overall value for each plan in relation to the development objectives. This subsidiary evaluation utilizes a series of matrices in which the development standards replace the development objectives in the matrix table, and in which it is usually not necessary to assign a probability estimate for the standard evaluation.

Ranking the Objectives/Standards

From the eight sets of objectives and standards presented in Chapter III, six were selected to serve as a basis for the comparative evaluation of the alternative plans.

1. *Performance* ~~Universal geographic coverage~~
2. *Universal geographic coverage* ~~Performance~~
3. Infrastructure cost
4. Redundancy
5. Public safety
6. Most demanding application – video and multimedia

The other two objectives: antenna base site minimization, and antenna aesthetics and safety were not used in the evaluation since these apply only to wireless telecommunications systems, and so can not serve as a basis for comparing wireline and wireless systems.

The above objectives were also ranked in a perceived order of priority -- or importance -- beginning with the highest in priority listed first. ~~Universal geographic coverage was assigned the highest priority since such coverage is not likely to occur within Southeastern Wisconsin through the operation of market forces alone, and without strong governmental incentives and encouragement. Performance was ranked next in order of priority since it represents the very definition of broadband telecommunications.~~ *Performance was ranked first since it represents the very definition of broadband telecommunications. Performance is also strongly related to the economic development goal of the telecommunications planning program. Universal geographic coverage was ranked second since such coverage is not likely to occur within Southeastern Wisconsin though the operation of market forces alone and without strong governmental incentives and encouragement.* Infrastructure cost also rank high since this cost is an important determinant of the economic viability of an alternative plan. Redundancy is an important feature of any telecommunication system because of the need for system reliability in a wide range of public and private applications. Public safety was designated an objective in its own right because maintenance of public safety and effective response to natural and man-made disasters represent two of the most important uses of modern telecommunications. Finally, the ability to meet the most demanding use of the telecommunications bandwidth -- video telecommunications -- was considered important to certain business and governmental functions as well as to the entertainment function of telecommunications systems.

EVALUATION BASED UPON STANDARDS

Prior to the application of the rank-based expected value method (RBEV) to aid in the selection of a regional comprehensive broadband telecommunications plan, each of the four alternative and two adjunct plans were evaluated and ranked on the basis of the ability to meet the supporting standards under each of the six objectives. Such an evaluation and ranking then provided the basis for final plan selection.

Performance Objective

The performance objective, as defined in Chapter III, embraces not only throughput -- transmission rate, but also network reliability and quality of voice communications. Ranking the alternate plans for this objective can be readily accomplished based upon the nature of the four alternate plan technologies. An

all fiber network, as represented by the FTTP plan, would clearly be first in rank in this respect. If the active (AON) rather than the passive (PON) optical network had been the selected technology, there would be little or no limit on ultimate network performance. PON technology does have some limitations based on network topology, but even with these restrictions, the FTTP has the highest ultimate performance potential. While the electronic equipment for wireline network may be expected to continue to evolve and improve, the fiber infrastructure will impose little or no performance limitations for many years to come.

The remaining plan alternatives, FTTN wireline and the two broadband wireless plans all promise to achieve 4G performance levels. The wireless plans, however, while competing favorably on throughput performance short-term and long-term, will probably never achieve the "five nines -- 99.999 percent -- reliability of wireline networks.

Based upon the foregoing considerations, the four alternative plans were ranked for performance as follows:

1. Fiber-to-the Premises (FTTP) Wireline Plan
2. Fiber-to-the Node (FTTN) Wireline Plan
3. Regional Wireless Plan
4. Community-Based Wireless Plan

Universal Geographic Coverage Objective

The universal geographic coverage objective, ranked ~~first~~ *second* in importance among the six plan objectives, is one well suited to plan comparison and evaluation. Only the two wireless alternative plans make such widespread geographic coverage a feasible objective. ~~The Fiber-to-the-Node (FTTN) and Fiber-to-the Premises (FTTP) alternative wireline plans will cover only 35 percent of the total area of the Region and will, therefore, not achieve high ranking for the geographic coverage plan objective.~~ *The Fiber-to-the-Node (FTTN) and Fiber-to-the-Premises (FTTP) wireless alternative plans would serve about 36 percent of the total area of the Region and, therefore, cannot achieve high rank for geographic coverage. Those alternative plans may, however, be expected to serve about 92 percent of the anticipated year 2035 resident population of the Region; about 93 percent of the land anticipated to be devoted to commercial use within the Region; and about 90 percent of the land anticipated to be devoted to industrial use within the Region in that year.* The community-based wireless plan has the potential for full geographic coverage of the Region, but such full coverage would depend on the deployment of broadband wireless networks in each of the Region's 147 cities, villages and towns, or in a somewhat

smaller number of cooperative municipal service areas. Such a universal adoption and deployment of broadband wireless networks is considered highly unlikely. Even if each municipality were to desire the installation of a community-based wireless network, there is no assurance, especially in low density rural areas, that private, or public, capital funds would be available to support the needed infrastructure deployment. *This potential lack of capital funding should not, however, be interpreted as indicating that there would be little demand for high-speed broadband telecommunications services in low density rural areas of the Region: experience has indicated the opposite to be true.* Only the regional wireless plan alternative has both the economic rationale and governmental support structure required for the attainment in a timely fashion of region-wide geographic coverage. The economic rationale is provided by a joint public safety-commercial antenna site infrastructure. The governmental support, however, would have to would come from the counties. While the regional wireless plan is truly region-wide in scope, the required joint public safety-commercial antenna site network could be accomplished on a county-by-county basis.

Based upon the foregoing considerations, the four alternative plans were ranked for geographic coverage as follows:

1. Regional Wireless Plan
2. Community-Based Wireless Plan
3. Fiber-to-the-Node (FTTN) Wireline Plan
4. Fiber-to-the Premises (FTTP) Wireline Plan

Infrastructure Cost Objective

~~Ranking of the alternative plans on the infrastructure cost minimization objective was accomplished on the basis of the system deployment capital cost estimates of:~~

~~1. Community-based Wireless Plan – $20.3 million~~
~~2. Regional Wireless Plan – $6.4 million~~
~~3. Fiber-to-the-Node Wireline Plan – $77.7 million~~
~~4. Fiber-to-the-Premises Wireline Plan – $246.0 million~~

~~The above infrastructure cost estimates are sufficiently separated in value such that uncertainties of estimations are not a major source of concern. Based on these costs the plans were ranked as follows:~~

~~1.Regional Wireless Plan~~

~~2.Community-Based Wireless Plan~~

~~3.Fiber-to-the-Node (FTTN) Wireline Plan~~

~~4.Fiber-to-the-Premises (FTTP) Wireless Plan~~

Two methods were used to determine the infrastructure costs of the alternative plans. The first set of infrastructure costs was limited to the actual capital costs of the infrastructure equipment with no provision for operating costs. The second method included the capital costs of the first method plus the present value of that portion of the operating costs representing capital substitution costs, i.e. the incrementally higher Internet access costs resulting from the purchase of Internet access locally at each antenna site rather than regionally based on a optic fiber cable backhaul network allowing for lower Internet access costs.

Based on the first method, the following infrastructure costs were estimated:

1. Community-based Wireless Plan
   - $20.3 million
2. Regional Wireless Plan
   - $6.4 million
3. Fiber-to-the-Node Wireline Plan
   - $77.7 million
4. Fiber-to-the Premises Wireline Plan
   - $246.0 million

Ranking of the alternative plans on the infrastructure cost minimization objective was also accomplished on the basis of the infrastructure costs plus the present value of any higher operating costs resulting from the avoidance of increased fiber infrastructure costs that would result in lower operating rates. The basic direct Internet access rate for the 141 base station sites of the Regional Wireless Plan and the 54 backhaul stations of the Community Wireless Plan is $70 per megabit per second per month. If additional fiber optic infrastructure were installed allowing for high volume Internet connections in the 5 gigabit per second range at only three connections, the Internet access rate would drop to $45 per megabit per second per month. The $25 per month difference in the two rates was then capitalized based on the present value of the payments over a ten year period at 5% interest rate. The modified infrastructure costs using the second method change only for the two wireless plans. The wireline plans

are assumed to have no substituted capital costs in their operating costs. Under the second method, the modified infrastructure costs were estimated as follows:

1. *Community-based Wireless Plan – $38.6 million*
2. *Regional Wireless Plan – $39.1 million*
3. *Fiber-to-the-Node Wireline Plan – $77.7 million*
4. *Fiber-to-the-Premises Wireline Plan – $246.0 million*

The above infrastructure costs do not allow for the public safety/private commercial infrastructure cost sharing that is an integral part of the Regional Wireless Plan. This cost sharing will significantly reduce the infrastructure cost of the Regional Wireless Plan, again making it the lowest cost plan alternative. Based on considering both methods of infrastructure costing, the plans were ranked as follows:

1. Regional Wireless Plan
2. Community-Based Wireless Plan
3. Fiber-to-the-Node (FTTN) Wireline Plan
4. Fiber-to-the-Premises (FTTP) Wireless Plan

All cost estimates here are based on the detailed cost breakdowns developed in Chapter VII which included wireless infrastructure costs in Table 2 and wireless operating costs in Table 3. Wireline cost estimation methodology is covered in the text for each plan alternative.

Redundancy Objective

The inclusion of redundancy as a separate objective was based, at least in part, on the almost universal failure of telecommunication networks, both public and private, in recent national natural and terrorist-inspired post disaster environments. Wireline and wireless networks failed to a large extent to operate after both the September 11, 2001, terrorist attack on the World Trade Center in New York and the Gulf hurricane of 2005 that destroyed much of the New Orleans area. Wireline as well as wireless telecommunications networks are critically dependent on major infrastructure elements such as central offices and antenna base sites. A variety of disaster-induced events such as explosion, grid power loss, or flooding as well as terrorist inspired sabotage, can severely damage telecommunication infrastructure. Emergency-related network traffic congestion can also disable a network even when the infrastructure remains intact. Network redundancy can also play an important role in normal network operation where high network reliability is required to maintain government, commercial and social

communications -- especially public health and safety related communications. Wireless networks in particular have experienced reliabilities far below the 99.9 percent standard due to a lack of network redundancy.

As already noted under the performance objective, wireline networks have demonstrated very high reliability in network operations. Such wireline networks, however, do not have known elements of network redundancy. Both the FTTN and FTTP networks are critically dependent on the operation of central offices. A disruption of a single central office operation may disconnect the entire service area of that office. In like manner, loss of a single antenna base station site can disrupt wireless communications over a wide service area. Protection against such communication disruptions requires redundancy in the network. Redundancy was defined in Chapter III as the "average number of alternative transmission paths between users in a network". Accordingly, network redundancy is created by providing alternative transmission paths through the networks. Traditional cellular wireless networks do not typically provide redundancy in the form of alternative transmission paths through the networks. Users communicate through the antenna base stations assigned for a particular time and location. Operational failure of the base station concerned will terminate all communications in the station service area. Established alternative paths are generally not available.

The most redundant communications network topology is the mesh network design. In a mesh network, users with omnidirectional antennas may connect with alternative access points. Once connected, alternative transmission paths through the network provide strong redundancy as long sufficient access points are available for such redundant transmission paths. Power outages and other emergency situations, however, can still drastically reduce the number of such alternative transmission paths. Comprehensive wireless network redundancy requires alternative transmission paths that are independent of the basic infrastructure. Such redundant independence is possible only in ad hoc, peer-to-peer mesh networks that employ the users themselves as backup transmission point nodes. Such an ad hoc mesh network differs from current mesh networks in two primary ways: (1) the ad hoc, peer-to-peer network serves only as an emergency supplement to the basic cellular network; and (2) the mesh network nodes are end users, serving as nodes not separate network elements. Both the community-based and regional wireless plans are envisioned as incorporating this backup ad hoc, peer-to-peer network feature to provide high levels of redundant network operation.

Redundant features of the FTTN and FTTP wireline networks, if any, are unknown at the present time. The basic structure of these networks does not lend itself to redundant transmission paths. Both are critically dependent on central offices for basic operation. Alternate paths to remote nodes from the host,

or from another central office, are not known to be provided. Disabling a node in an FTTN network will terminate communications in its square mile service area. Failure of a splitter node in a FTTP network will terminate communications in its service area. In the absence of additional information, redundancy in the FTTN and FTTP wireline networks must be assumed to be low or nonexistent. The redundancy of an FTTP network must be rated better than an FTTN network only because a fiber splitter is a passive component ~~based underground~~, while a FTTN node operates with ~~generally above ground~~ active electronic equipment. Based on the forgoing considerations, network redundancy for the alternative plans was ranked as follows:

1. Regional wireless plan
2. Community-based wireless plan
3. Fiber-to-the-premises (FTTP) wireline plan
4. Fiber-to-the-node (FTTN) wireline plan

Public Safety Objective

The public safety objective relates to the response of the telecommunications system in supporting public safety objectives both in normal operations and in public safety emergencies. Because the Regional Wireless Plan would be jointly designed with the public safety communications network, it would directly support public safety communications in the Region. Community-based wireless networks may also choose to integrate network access points, or antenna base stations, into a shared public-commercial framework in which infrastructure development costs are shared. Such cost sharing directly enhances public safety by leveraging the public safety communications investment for enhanced public safety communications performance.

Wireline Networks, since they do not support mobile, or nomadic users, are less directly involved with public safety communications. Wireline networks, however, are routinely used for public safety communications between fixed locations, and can serve the public safety objective by granting priority to public safety traffic particularly in times of public emergency. The FTTN broadband wireline network would be particularly useful to public safety because of its wider availability throughout the Region. Based on the foregoing considerations, the alternative plans were ranked as follows:

1. Regional wireless plan
2. Community-based wireless plan
3. Fiber-to-the-node (FTTN) wirelines plan
4. Fiber-to-the premises (FTTP) wireline plan

Most Demanding Application Objective

Video, in both its broadcast and videoconferencing forms, is the most demanding broadband communications application. Bandwidth requirements for video can range from 256 kilobits per second to 200 megabits per second depending on application and desired quality. Broadcast television, even in its least demanding form, requires at least five megabits per second. The FTTN and FTTP plans, as presently being deployed by telephone carriers, such as AT&T and Verizon, are primarily aimed at the broadcast television market. As presently constituted, they are asymmetric and so do not support high quality videoconferencing. Videoconferencing, however, has not yet developed as a major application, and so generates minor traffic in comparison to broadcast television. For this reason, the plans were ranked primarily on their downstream throughput performance as follows:

1. Fiber-to-the premises (FTTP) wireline plan
2. Fiber-to-the-node (FTTN) wireline plan
3. Community-based wireless plan
4. Regional wireless plan

Rank-Based Expected Value Plan Evaluation

Plan evaluation using the rank-based expected value method involves the combination of rank value calculations and an estimate of the probability of implementation. Beginning with the community-based wireless plan, each plan was scored based on these rank valuations and implementation probability estimates.

Community-Based Wireless Plan

The community-based wireless plan received the following rankings and related scores:

	Performance	Universal Geographic Coverage	Infrastructure Cost	Redundancy	Public Safety	Most Demanding Application
Rank	4	2	2	2	2	3
Score	1	3	3	3	3	2
Weight	6	5	4	3	2	1
Value	6	15	12	9	6	2

Summation of the above value provides a total valuation score of 50.

Estimating the probability of implementation of this plan is a difficult task since the implementation depends on deployment in each of the 147 cities, villages and towns within the Region, or on somewhat smaller number of cooperative municipal service areas. Counties are excluded since they are better

served by the Regional Wireless Plan. Regional communities have already begun to consider the process of deploying community wireless networks, but the probability of all of the communities in the Region adopting community wireless plans within the plan implementation period is judged to be about 60 percent, for a probability estimate of 0.6. Combining the probability with the rank valuation score of 50 produces a total plan evaluation value for the Community Based Wireless Plan of 30.0.

Regional Wireless Plan

Following the same scoring procedure for the Regional Wireless Plan provides the following.

	Performance	Universal Geographic Coverage	Infrastructure Cost	Redundancy	Public Safety	Most Demanding Application
Rank	3	1	1	1	1	4
Score	2	4	4	4	4	1
Weight	6	5	4	3	2	1
Value	12	20	16	12	8	1

Summation of the above values provides a total valuation score of 69.

Initially, the probability of implementation of a regional wireless plan was judged to be rather low because there is no regional governmental authority to carry out such a plan. Recent experience with a potential demonstration project in Kenosha County, however, indicates a higher probability of implementation on a county-by-county basis. A successful implementation of the plan in a single county such as Kenosha could ignite sufficient interest for other counties to follow suit for an eventual regionwide deployment. Such a possibility raises the probability of implementation to 60 percent (0.6) for a plan evaluation value of 41.4.

The Kenosha County joint public safety/WiFiA wireless communications demonstration project is currently at the contract closure stage and is scheduled to begin in September, 2007. The project activities will include a detailed 4.9GHz (public safety) and 5.8 GHz (commercial WiFiA) plan followed by a field demonstration of long-range, high-performance at 4.9 GHz communications with law enforcement vehicles. The project will also include a demonstration of peer-to-peer backup communications for public safety that would provide for network continuity when infrastructure is damaged in major public emergencies. If the field demonstration project is successful, Kenosha County intends to implement an early broadband public safety communications safety deployment that is county-wide in coverage.

Fiber-to-the-Node (FTTN) Wireline Plan

The FTTN Wireline plan was scored as follows:

	Performance	Universal Geographic Coverage	Infrastructure Cost	Redundancy	Public Safety	Most Demanding Application
Rank	2	3	3	3	3	2
Score	3	2	2	2	2	3
Weight	6	5	4	3	2	1
Value	18	10	8	6	4	3

Summation of the above values provides a total valuation score of 49.

The probability of FTTN plan implementation is quite high since AT&T is already implementing an FTTN network in the Region. The primary obstacle to assigning a probability implementation of 100 percent is that AT&T is not the ILEC in all of the FTTN – proposed service areas within the Region. AT&T has also clearly stated that it will not provide universal geographic coverage, but coverage only in those areas promising an adequate economic return. These limitations lower the implementation value to 0.8, the highest of any of the plan alternatives. Such a probability produces an FTTN plan evaluation value of 39.2.

Fiber-to-the-Premises (FTTP) Wireline Plan

The FTTP Wireline Plan was scored as tabulated below:

	Performance	Universal Geographic Coverage	Infrastructure Cost	Redundancy	Public Safety	Most Demanding Application
Rank	1	4	4	3	4	1
Score	4	1	1	2	1	4
Weight	6	5	4	3	2	1
Value	24	5	4	6	2	4

Summation of the above values provides a total valuation score of 45.

With the major regional ILEC, AT&T deploying a lower cost alternative wireline technology (FTTN), the probability of implementation of an FTTP network must be considered extremely low. AT&T must recover its return on the FTTN investment, and the FTTN nodal infrastructure still leaves the major costs of an FTTP to be covered in a network expansion. These costs relate to the fiber installation expenses from the nodes to each of the user premises. A probability of implementation of 0.3 seems appropriate. Such a probability produces an FTTP plan evaluation value of 13.5

Rank-Based Expected Valuation (RBEV) Summary

The RBEV summary of the four alternative plans in priority order is listed below:

1. Regional Wireless Plan
   V=41.4

2. FTTN Wireline Plan
   V=39.2

3. Community Wireless Plan
   V=30.0

3. FTTP Wireline Plan
   V=13.5

Based on the above valuation, the Regional Wireless Plan is the plan of choice. The RBEV rank of this plan is further enhanced by the public-private consortium nature of the plan which improves governmental functions such as public safety while sharing infrastructure costs with a 5.8 GHZ commercial wireless network.

None of the above primary plans provide for the mobile (cell phone) users. The fiber link plans, both FTTN and FTTP do not provide for either the nomadic (laptop computer) or the mobile user. The community and regional wireless networks offer broadband communication services to the nomadic user. Since mobile communications will play a dominant role in future broadband communications, each of the above primary plans must be supplemented with an adjunct broadband mobile wireless network.

WiMAX versus WiFi for a Regional Mobile Broadband Wireless Network

The two alternative broadband wireless networks described in Chapter VII utilized either WiMAX or WiFi technologies. Adjunct Plan A was an independent plan based on WiMAX (IEEE Standard 802.16e) and deployed 743 base stations throughout the Region. Adjunct Plan B was a true adjunct plan in that its implementation depended on the pre-existence of one of the two alternative wireless plans – regional or community-based – for its implementation. Following the same approach used for the primary alternative plan evaluation, these two adjunct plans will be rank-evaluated for each of the Chapter III objective standards.

Performance Objective

Early released versions of WiMAX mobile wireless technology do not provide for the throughput data rates of 20 megabits per second as specified in the Chapter III performance standard. Later versions will

probably improve in performance but at unknown rate. The WiMAX plan illustrated in Map 8 depicts 20 megabits per second performance in most areas throughout the Region. Such performance was achieved through the deployment of a very large number of antenna base stations (743).

The WiFi and WiFi A based mobile wireless plan, as illustrated in Maps 9 and 10, achieves the specified throughput performance using the community-based wireless network but not with the regional wireless network. Some new features will be added to the regional wireless plan to upgrade throughput performance to standard level, but these features are still untested and so can not be relied upon at this time. Given the uncertainty in this aspect of the regional wireless plan, the WiMAX plan must be ranked higher.

1. WiMAX Mobile Wireless Plan A
2. WiFi Mobile Wireless Plan B

Universal Geographic Coverage Objective

Because it employs licensed radio frequency bands, the WiMAX adjunct mobile wireless plan A must be deployed by a major wireless carrier that owns spectrum in these licensed bands. The high cost of region-wide WiMAX deployment combined with the low economic return expected in lower density rural areas makes it highly unlikely that any private wireless carrier would provide region-wide mobile wireless WiMAX coverage. WiFi Plan B, in contrast, operates off a primary wireless infrastructure, either the regional and the community-based, and so has a reasonably high probability of region-wide implementation. Given this situation, the WiFi mobile wireless plan outranks its alternative adjunct WiMAX plan.

1. WiFi Mobile Wireless Plan B
2. WiMAX Mobile Wireless Plan A

Infrastructure Cost Objective

With an estimated infrastructure cost of $38.0 million, the mobile wireless WIMAX plan far exceeds in cost any added features needed to extend the range or performance of the Regional Wireless Plan for mobile users as called for in Adjunct Mobile Wireless Plan B. With the Community Based Wireless Plan, there is little or no added infrastructure costs to support mobile wireless users. The Regional Wireless Plan will require some infrastructure augmentation, but at no where near the level of the WiMAX

alternative. In either event, the WiFi adjunct plan provides a lower cost alternative than WiMAX based Plan A.

1. WiFi Mobile Wireless Plan B
2. WiMAX Mobile Wireless Plan A

Redundancy Objective

Both the regional and community-based primary wireless plans will be augmented by design features that allow for alternate transmission paths through the network. Based on such design features, WiFi adjunct plan B will have built-in redundancy not known to be featured in WiMAX. For this reason, the WiFi-based mobile wireless plan must be ranked above the WiMAX alternative for network redundancy.

1. WiFi Mobile Wireless Plan B
2. WiMAX Mobile Wireless Plan A

Public Safety Objective

A major feature of the Regional Wireless Plan is its joint public safety-commercial capabilities. As an adjunct to the Regional Wireless Plan, the WiFi Mobile Wireless Plan B would incorporate a capability for communication with hand-held devices including cell phones. WiMAX mobile wireless networks could also operate in the 4.9 GHz public safety frequency band, but this additional capability is not likely to be incorporated in a region-wide WiMAX network by a private wireless service provider. As an adjunct to a community-based WiFi network, Plan B also requires a 4.9 GHz upgrade. On balance, however, the WiFi mobile wireless Plan B better serves this objective.

1. WiFi Mobile Wireless Plan B
2. WiMAX Mobile Wireless plan A

Most Demanding Application Objective

With equivalent bandwidth capability, both the WiFi and the WiMAX can serve the demands of video and multimedia communications. The improved quality of service (QoS) features of WiMAX would appear to favor WiMAX for this objective.

1. WiMAX Mobile Wireless Plan A
2. WiFi Mobile Wireless Plan B

RANK-BASED EXPECTED VALUE ADJUNCT PLAN EVALUATION

Based on the above rankings the following two tables summarize the valuation scores for the WiMAX and WiFI mobile wireless plans.

WiMAX Mobile Wireless Plan A

	Performance	Universal Geographic Coverage	Infrastructure Cost	Redundancy	Public Safety	Most Demanding Application
Rank	1	2	2	2	2	1
Score	2	1	1	1	1	2
Weight	6	5	4	3	2	1
Value	12	5	4	3	2	2

Summation of the above value provides a total valuation score of 28.

The probability of implementation of a broadband mobile wireless plan must be considered rather low because of the cost and the low financial return in rural areas of the Region. There is also some basis for questioning the need for 4G-level throughput in many areas of the Region. These uncertainties result in a implementation probability of only 0.3 which results in a plan evaluation value of only 8.4.

WiFi Mobile Wireless Plan B

	Performance	Universal Geographic Coverage	Infrastructure Cost	Redundancy	Public Safety	Most Demanding Application
Rank	2	1	1	1	1	2
Score	1	2	2	2	2	1
Weight	6	5	4	3	2	1
Value	6	10	8	6	4	1

Summation of the value provides a total evaluation score of 35.

The probability of implementation of this WiFi mobile wireless plan is quite high since it operates off the infrastructure of either the regional or community-based wireless plan. Given the region-wide deployment of either of these fixed user plans, the addition of a mobile wireless capability is judged to be highly likely, so that it should be assigned the same probability of implementation as those two plans which is 60% or 0.6. Such a probability value results in a total plan evaluation value of 21.0.

It is clear from the above that the WiFi mobile wireless plan is the clear winner in the RBEV valuation and probably the only broadband wireless plan able to economically achieve 4G standards in the entire Region.

Regional Comprehensive Broadband Telecommunications Plan Selection

Based on the Rank-Based Expected Value scoring, the leading contender for adoption as the regional telecommunications plan would be the Regional Wireless Plan supplemented by the WiFi Mobile Wireless Adjunct Plan. Together, these two complementary plans would meet the objectives and standards established in Chapter III for a comprehensive, regional broadband telecommunications system to serve the Region in the coming decade. Other considerations, however, require the provision of flexibility in the structure of the plan. This flexibility is required for the following reasons:

1. Existing and Expected Broadband Wireline Network Deployments

   AT&T has already begun the deployment of a Fiber-to-the-Node Broadband Wireline Network in Southeastern Wisconsin. Time Warner and Charter Communications also have the potential of upgrading their cable network in a modified FTTN configuration to satisfy fourth generation broadband requirements. Since these new or modified networks are in least partial compliance with current 4G objectives and standards, flexibility must be provided within the recommended plan to accommodate the continued deployment of these wireline networks.

2. Existing and Expected Community-Based Broadband Wireless Network Deployments

   Strong interest in community-based broadband wireless networks currently is evident within the Region. Initial deployment of some of these networks is already underway. Since those networks would operate in a different frequency band than that which would be used for the regional wireless plan -- 2.4 GHz for the Community-based systems and 5.8 GHz for the regional plan -- they are operationally compatible and could serve together in the Region.

3. Broadband Communications Competition

   In the current regulatory environment, consumer protection and technology innovation are both fostered by competition. It is Federal communications policy as set forth by the Congress and the Federal Communications Commission to encourage such competition. For these reasons, the recommended regional broadband telecommunications plans must provide for a level of diversity that recognizes current trends and the desire for a competitive telecommunications environment.

With the Rank-based Expected Value evaluation results as a foundation, but upon consideration of the foregoing trends and the desire for broadband competition in the Region, the following composite regional comprehensive broadband telecommunications plan is recommended for adoption within Southeastern Wisconsin:

1. Regional Wireless Plan for region-wide broadband coverage to serve fixed and later nomadic users; and
2. WiFi-based Mobile Wireless Plan B - for region-wide broadband coverage of mobile users

The above primary plan components would be supplemented by:

1. Fiber-to-the Node Wireline Plan
   - to provide television and related broadband services within the urbanized areas of the Region
2. Community-Based Wireless Plans
   - for communities selecting local networks to compete with and complement the regional wireless networks.
   - to further support the WiFi-based Mobile Wireless Plan B

Public Sector Broadband Wireless Networks

All of the above alternative broadband communications plans relate to commercial networks generally owned and operated by private service providers. These plans and the final selected composite plan are intended as an advisory plan to the private sector. A separate class of telecommunications networks relate to functions performed by the public sector. These public enterprise telecommunications networks were described in SEWRPC Memorandum Report No. 164, *Potential Public Enterprise Telecommunications Networks for Southeastern Wisconsin*, September, 2005.

One of the particularly important classes of potential public enterprise telecommunications networks described in the aforereferenced report are public safety emergency response networks which support law enforcement, firefighting, pre-hospital emergency medical service (EMS), and public works personnel with their communications needs. This class of network was described in the aforereferenced report with emphasis on high speed data, video, and multimedia applications in the new FCC (2002) frequency spectrum of the 4.9 GHz band. This band is dedicated solely to public safety applications and has sufficient bandwidth -- 50 MHz -- to support high speed fourth generation (4G) communications

performance. Experimental deployment of 4.9 GHz is expected in the next few years. Initial applications will emphasize data and video transfer but extension to voice communication is expected to rapidly follow.

There is a strong synergy between the needs of public safety communications and the recommended regional telecommunications plan. Based upon interoperability needs, there is broad agreement that public safety communications should be regional in nature. The perpetuation of various community-based communications networks is not in the interest of effective operations particularly in times of major, disaster-level emergencies.

The wireless element of the recommended regional telecommunications plan could not only support commercial broadband wireless communications, but also region-wide, interoperable public safety broadband telecommunications. The estimated infrastructure cost of the recommended plan of $6.4 million made no allowance for base station site cost sharing between the public and commercial wireless networks. The close proximity of the public safety band -- 4.9 GHz -- and the commercial WiFiA band -- 5.8 GHz -- makes such base station cost sharing feasible and useful. Such cost sharing would further reduce the regional wireless plan infrastructure cost, and would allow for ready accomplishment of region-wide geographic coverage, an important objective of the regional telecommunications planning effort. Thus the recommended regional telecommunications plan has a unique advantage in being able to support both commercial and public sector broadband telecommunications in the Region.

PCE/KWB/KJS/lgh
08/27/07
#127516 V2 - T/C - PR No. 53 -Chapter VIII-Alternative Plan Comparison And Evaluation And Selection

Original

Plan **Community-Based Wireless Plan**

	Un Cov	Performance	Infra Cost	Redundancy	Public Safety	Video Appl
Rank	2	4	2	2	2	3
Score	3	1	3	3	3	2
Weight	6	5	4	3	2	1
Value	18	5	12	9	6	2

Probability 0.6

RBEV 52 **31.2**

Plan **Regional Wireless Plan**

	Un Cov	Performance	Infra Cost	Redundancy	Public Safety	Video Appl
Rank	1	3	1	1	1	4
Score	4	2	4	4	4	1
Weight	6	5	4	3	2	1
Value	24	10	16	12	8	1

Probability 0.6

RBEV 71 **42.6**

Plan **FTTN**

	Un Cov	Performance	Infra Cost	Redundancy	Public Safety	Video Appl
Rank	3	2	3	3	3	2
Score	2	3	2	2	2	3
Weight	6	5	4	3	2	1
Value	12	15	8	6	4	3

Probability 0.8

RBEV 48 **38.4**

Plan **FTTP**

	Un Cov	Performance	Infra Cost	Redundancy	Public Safety	Video Appl
Rank	4	1	4	3	4	1
Score	1	4	1	2	1	4
Weight	6	5	4	3	2	1
Value	6	20	4	6	2	4

Probability 0.3

RBEV 42 **12.6**

Variation #1

Plan **Community-Based Wireless Plan**

	Un Cov	Performance	Infra Cost	Redundancy	Public Safety	Video Appl
Rank	2	4	1	2	2	3
Score	3	1	4	3	3	2
Weight	5	6	4	3	2	1
Value	15	6	16	9	6	2

Probability 0.6

RBEV 54 **32.4**

Plan **Regional Wireless Plan**

	Un Cov	Performance	Infra Cost	Redundancy	Public Safety	Video Appl
Rank	1	3	2	1	1	4
Score	4	2	3	4	4	1
Weight	5	6	4	3	2	1
Value	20	12	12	12	8	1

Probability 0.6

RBEV 65 **39**

Plan **FTTN**

	Un Cov	Performance	Infra Cost	Redundancy	Public Safety	Video Appl
Rank	3	2	3	3	3	2
Score	2	3	2	2	2	3
Weight	5	6	4	3	2	1
Value	10	18	8	6	4	3

Probability 0.8

RBEV 49 **39.2**

Plan **FTTP**

	Un Cov	Performance	Infra Cost	Redundancy	Public Safety	Video Appl
Rank	4	1	4	3	4	1
Score	1	4	1	2	1	4
Weight	5	6	4	3	2	1
Value	5	24	4	6	2	4

Probability 0.3

RBEV 45 **13.5**

Eliminate one option

Plan **Community-Based Wireless Plan**

	Un Cov	Performance	Infra Cost	Redundancy	Public Safety	Video Appl
Rank	2	4	2	2	2	3
Score						
Weight						
Value						

Probability

RBEV

Plan **Regional Wireless Plan**

	Un Cov	Performance	Infra Cost	Redundancy	Public Safety	Video Appl
Rank	1	3	1	1	1	3
Score	3	1	3	3	3	1
Weight	6	5	4	3	2	1
Value	18	5	12	9	6	1

Probability 0.6

RBEV 51 **30.6**

Plan **FTTN**

	Un Cov	Performance	Infra Cost	Redundancy	Public Safety	Video Appl
Rank	2	2	2	3	2	2
Score	2	2	2	1	2	2
Weight	6	5	4	3	2	1
Value	12	10	8	3	4	2

Probability 0.8

RBEV 39 **31.2**

Plan **FTTP**

	Un Cov	Performance	Infra Cost	Redundancy	Public Safety	Video Appl
Rank	3	1	3	2	3	1
Score	1	3	1	2	1	3
Weight	6	5	4	3	2	1
Value	6	15	4	6	2	3

Probability 0.3

RBEV 36 **10.8**

Heis, Lynn G.

From: Michael Falaschi [mfalaschi@e-vergent.com]
Sent: Monday, August 06, 2007 9:07 PM
To: Heis, Lynn G.
Subject: Telecommunications Advisory Committee Meeting 8/7/2007

Hi Lynn,
after reading the furnished planning report that will be presented at tomorrows Advisory Committee meeting will you please record my vote as a No. Dr. Bauer and Mr. Evenson have recently made a strong case to me in favor of planning. I am in agreement with them for the need to plan. However after looking at this plan I feel that this in not the right plan. It is too expensive to operate and doesn't do enough to address short fall areas of the region. It is based primarily on unlicensed WI-FI and unproven Wi-Max technologies and isn't specific enough beyond costs and locations. Thank you for recording my vote and comments for the record.

Sincerely,
Mike Falaschi
President Wisconsin Internet Inc.
Member - SEWRPC Telecommunications Advisory Committee
262-498-4335