

The Effect of Changes in Universal Service Funding on the Economic Contribution of Rural
Local Exchange Carriers to the North Dakota State Economy

Gregory McKee

Department of Agribusiness and Applied Economics

Agricultural Experiment Station

North Dakota State University

Fargo, ND 58108

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Executive Summary

Rural local exchange carriers (RLECs) are a vital component of the North Dakota economy. Owned by their customers or operating as privately-held firms, eighteen RLECs provide low-cost telecommunications services and make purchases of goods and services that have stimulated the state economy since construction of the associated telecommunications infrastructure began in the 1950s.

Besides their economic output, the RLECs provide jobs, labor income and tax revenue to the state. Additionally, there are important intangible benefits, such as access to telecommunications service, charitable giving, community involvement, and stable, affordable telecommunication service prices.

The economic contribution of the North Dakota RLECs reaches beyond the communities where the RLEC is headquartered to the entire state. In 2010, operation of eighteen North Dakota RLECs generated \$220 million in gross business sales. Adding the secondary business volume attributable to RLEC operations brings the total economic contribution of RLECs to the North Dakota economy to \$321 million.

The direct and secondary effects of RLEC operations account for approximately 1900 jobs in North Dakota. These jobs result in \$103 million in earnings to workers in the state. The North Dakota RLECs employ an estimated 1100 people full time, including corporate and customer support and internet and telephone technicians and other employees. It is estimated that 86% percent of RLEC employees live in North Dakota. These jobs pay substantially higher salaries than the average wage in all North Dakota counties.

North Dakota RLECs make substantial purchases in North Dakota, where the sector spent nearly \$184 million in 2010 (including employee compensation). Purchases totaled over \$185 million outside North Dakota. Indirect economic activity generated by RLEC purchases and operation led to \$101 million in sales within the state.

The RLECs generated an estimated \$22 million in compensation, property and sales and use taxes within the state in 2010. They generated another \$13.9 million in federal taxes.

Besides using revenues to generate their economic contribution, the sector utilizes the Federal Universal Service Fund (USF) to help keep telecommunication services affordable and available in North Dakota. In 2010, the average North Dakota RLEC received 51% of its revenues from the USF. The average USF cost per loop was approximately \$700. In addition, RLECs provide broadband service throughout the state, with an average 89% of their customers having access to broadband service.

Section 1: Introduction

This economic contribution study, conducted by the Quentin Burdick Center for Cooperatives, at North Dakota State University, examines the economic and other contributions provided by the eighteen rural local exchange carriers serving North Dakota to the state economy. These carriers are either owned by their customers (89 percent of firms), or some other group (11 percent). The analysis uses detailed data from the North Dakota RLECs to assess these contributions.

This study focuses primarily on contributions to the North Dakota state economy. These include direct impacts—such as people employed by the RLECs, expenditures within the state and corporate tax payments—and indirect impacts, including jobs created indirectly by RLEC expenditures in the local economy. The study also discusses other benefits provided by the RLECs, such as reliable, low-cost telecommunications service, access to telecommunications service, charitable giving, and community involvement.

All RLECs headquartered in North Dakota were invited to participate in this study. Under conditions of confidentiality, nine companies provided data on employment, operating expenditures, revenues, and tax payments, as well as guidance on particular details specific to North Dakota and telecommunications services. In order to calculate the economic contribution of all eighteen firms on the North Dakota economy, estimated financial data were generated based on average costs and revenues per line.

A nationally recognized model was used to estimate the direct and secondary contribution of the RLECs on the state economy. MIG a research organization in Minneapolis, MN, developed the software employed in this analysis.

The remainder of this report contains four sections. Section 2 discusses the methodology used to complete the study and Impact Analysis for Planning, the economic modeling software used for this report. Section 3 provides background on the North Dakota RLECs, including costs, employment, service history and performance, taxes, and other information. Section 4 examines the economic contribution of the RLECs at the state level. Section 5 presents calculations of how changes in federal universal service funding may affect the economic contribution of North Dakota RLECs to the state economy, including benefits not captured by the economic modeling software.

Section 2: Economic Impact Analysis Methodology

The methodology used to estimate the economic contributions of the North Dakota rural local exchange carriers is called input/output analysis. This method allows systematic analysis of the economic links among geographic regions by virtue of their distribution of industrial purchases. In this section, the population of cooperatives considered in this study is presented and the geographic scope of the report is described. The methodology, underpinnings and typical applications of input/output analysis are discussed. It also describes how cooperative business data and the IMPLAN model estimate the statewide economic contributions of cooperative business operations.

2.1 Identifying Rural Local Exchange Carriers in the North Dakota Economy

The North Dakota Association of Telecommunications Cooperatives maintains a directory of all corporations doing business in North Dakota as RLECs. A count of RLECs in this directory was made, resulting in eighteen companies. Only business activity conducted in

North Dakota was considered for this analysis. Nine of these companies responded to a request for data. In order to estimate gross sales for the remaining firms, assumptions were made about the relative size of the revenues of these firms when compared with the nine companies. Based on these assumptions, a proportional estimate of revenues and payroll expenditures were generated and used as inputs for the IMPLAN software.

2.2 Use of Input/Output Models

Input/output models capture input (demand), and output (supply), interrelationships for industry and government sectors in a geographic region. They also capture the consumption of goods and services for final demand by these sectors and by the household sector. These models typically are used when the following key questions need to be addressed:

- How much spending does an economic activity (such as a power plant) bring to a region or local area?
- How much of this spending results in sales growth by local businesses?
- How much income do local businesses and households generate?
- How many jobs does this activity support?
- How much tax revenue does this activity generate?

Typical applications of these models include facility or military base openings and closings, transportation or other public infrastructure investments, industrial recruitment and relocation, and measuring the contribution of a given industry. The basic geographic region for this study is the state, but model results can be developed at the multi-county, state, multi-state and national levels.

2.3 Overview of the Input/Output Methodology

Input/output models link various sectors of the economy by their respective spending flows in a reference year. Because of these linkages, the contribution of an economic activity in any sector or geographic area on other sectors and areas can be modeled. These contributions can extend well beyond the sector and area in which the original economic activity is located. They include not only the direct, or initial, effects of the economic activity, but also the secondary, or “ripple,” effects that flow from this activity. Direct effects are analogous to the initial “splash” made by the economic activity, and ripple effects are the subsequent “waves” of economic activity (new employment, income, production and spending) triggered by the splash. A full accounting of the splash must include the waves, as well as the splash itself.

The sum of the two effects is the total effect, and the ratio of the total effect to the direct effect is the “total effect multiplier,” or simply the multiplier effect. Multipliers can be developed for any industry/business sector or geographic area in the model. Multipliers for a county are smaller than for a larger area, such as the state in which the county is located, because some spending associated with an economic activity migrates from the small area into the larger area. At the local area level, multipliers are larger if the local area produces the types of goods and services required by the firm.

Secondary effects include two components—indirect and induced effects—modeled separately within input/output models. Indirect effects are those influencing the supply chain that feeds into the business/industry sector in which the economic activity is located. For example, when an RLEC buys a shovel for \$5, it contributes directly to the economy. Consequently, the company that makes the shovel increases its purchases of steel and wood to maintain its inventory, thus increasing sales in the steel and wood industries. These industries then will have

to purchase more inputs for their production processes, and so on. The result will be an economic contribution that is greater than the \$5 initially spent for the shovel.

The increased income of firm employees and other regional workers leads to higher spending at the household level. That increased spending is the induced effect. To illustrate, when an RLEC pays \$5 for a shovel, a portion of the \$5 pays the wages of employees at the company that makes the shovel.

Input/output models incorporate several simplifying assumptions. Input/output models assume a fixed commodity input structure. This means the “recipe” for producing a product or service is fixed, both in terms of inputs and process. A second assumption is constant returns to scale. A doubling of commodity or service output requires a doubling of inputs, and a halving of commodity or service output requires a halving of inputs. There is no opportunity for input use relative to commodity or service production levels to change, as those levels expand or contract, so there are no opportunities for either economies or diseconomies of scale. A third assumption is that input/output models assume no input supply or commodity/service production capability constraints. A final assumption is that all firms and technologies within sectors are very similar.

2.4 The IMPLAN Model and Its Application to North Dakota RLECs

Several software packages are available in the marketplace that perform input/output analysis. Among these are Impact Analysis for Planning (IMPLAN), Regional Economic Models and Regional Input-Output Modeling System II. The IMPLAN was selected for this study model primarily because of the availability of the model and data sets.

The U.S. Department of Agriculture’s Forest Service developed IMPLAN, in cooperation with the Federal Emergency Management Agency and the U.S. Department of the Interior’s

Bureau of Land Management, to assist in land and resource management planning. In use since 1979, the Minnesota IMPLAN Group Inc. (MIG) supports the model.

The IMPLAN system consists of two components: software and a database. The software performs the necessary calculations using data associated with a defined geographic study area. It also provides an interface for the user to change a region's economic description, create contribution scenarios and introduce changes into the local model.

The IMPLAN software enables at least three functions: data retrieval, model development, and contribution analyses. The IMPLAN database consists of two major parts: national technology matrices and estimates of regional data for institutional demand and transfers, value added, industry output, and employment for each county in the United States, as well as state and national totals. The model's data and account structure closely follow the accounting conventions used in the input/output studies of the U.S. economy by the U.S. Department of Commerce's Bureau of Economic Analysis. The program is, therefore, flexible in that it provides comprehensive data coverage of North Dakota by county and allows the user to provide model-specific information as well.

In applying the IMPLAN model to the North Dakota RLECs, three basic types of data were required: total revenue, employee compensation expenditures and tax payment data for 2010. The revenue and employment data were mapped to an appropriate IMPLAN North Dakota model sector codes by identifying the industry from which the expenditures associated with these revenues were obtained and assigning them an industrial classification code within IMPLAN sector codes. These assignments are made based on the comprehensive model of the North Dakota economy designed by IMPLAN and based on data from the U.S. Department of Commerce. Based on the circular flow of funds between expenses and revenues, I assume total

gross sales reflect the full economic contributions of the firm. These data then were incorporated into the IMPLAN model, which combined specifics of the local economy with data on the economic activity of the cooperatives to provide estimates of their total contributions. Once the data sets were complete, IMPLAN developed the economic contribution estimates detailed in this report.

Section 3: The North Dakota Rural Local Exchange Carriers

This section provides background information on RLECs and North Dakota to frame the results of this report, including a brief history of the RLECs, a description of their output, employment, volume of federal universal service funding support, and financial performance.

3.1 History and Information

“In 1950, North Dakota had about 120,000 telephones. Of that number, 91,000 served the larger cities and were owned and operated by five companies... Of the remaining 29,000 telephones in the state, 17,000 were owned by 114 telephone companies which operated 140 exchanges; and 11,000 telephones were operated by 700 stock companies” (Nagel and Nagel 1975). These companies were often “family operations consisting of a single exchange which served a rural community” (Nagel and Nagel 1975). It was estimated that less than 25% of farms received “satisfactory” telephone service at that time.

In 2010, eighteen North Dakota RLECs are headquartered throughout the state. They operate by sending telecommunications signals via copper, fiber, or wireless transmission facilities, with spectrum purchased/leased from the FCC. Throughout their operation, North Dakota RLECs have been a well-functioning component of the U.S. telecommunications industry.

3.2 Production

In 2010, North Dakota RLECs provided broadband and dialup modem internet service; provided access to video programming; provided telephone service to residential and business customers; and provided cell phone service. These services were offered through a variety of broadband speed options, video service packages, and cell phone plans. An estimated 66,000 customers received broadband service (a statewide average of 89% of all RLEC customers), 3,000 received dialup internet service, 21,000 received video service, 147,000 received telephone service, and 16,000 received cell phone service from the RLECs. North Dakota had an estimated population of 673,000 in 2010, and an estimated 273,000 households (US Department of Commerce, 2011). Revenue generated by RLECs within the state is distributed across these categories of service, with an average 14% of RLEC revenue related to broadband service, 44% from residential or commercial telephone service (including cell), 7% from video service and 34% from other sources (primarily access services).

The RLECs serve almost the entire area of North Dakota. They average 1.7 access lines per mile of line and 2.1 subscribers per square mile.

3.3 Employment

North Dakota RLECs provide a large number of well-paying jobs to residents of the state and surrounding area. The RLECs serving North Dakota employ an estimated 1,100 people full time. Their job descriptions include corporate management; project and operations managers; marketers; accountants; utility, video, and network technicians; customer service representatives; purchasers; and cable locaters. An estimated 950 full time employees reside within North Dakota, approximately 90 percent of RLEC total full time employment.

Jobs provided by North Dakota RLECs typically pay more than average in the area. Average annual full-time labor compensation, including wages and benefits, for RLEC employees is estimated to have averaged \$68,000 in 2010. This is equivalent to a weekly compensation of nearly \$1,300. This is approximately 80 percent greater than \$726 average weekly compensation of workers statewide (US Department of Commerce, 2011)¹. It is also greater than the average weekly compensation in all counties served by the RLECs.

3.4 Federal Universal Service Fund Support in North Dakota RLECs

North Dakota RLECs receive funding from the Federal Universal Service Fund. Below are average and total support received by all nine reporting RLECs in 2010 (Table 1).

Table 1. Average and Total Federal Universal Service Fund Support for North Dakota RLECs in 2010

	Average Support	Total Support
USF high cost loop support	\$ 2,000,000	\$ 17,700,000
Average HCL cost per loop	\$ 700	
USF support as average share of revenue	54%	
USF safety valve support	\$ 300,000	\$ 1,300,000
ICLS revenue requirement	\$ 2,300,000	\$ 20,300,000
Local switching support	\$ 400,000	\$ 3,800,000

¹ Includes an average of both full and part time compensation.

3.5 Financial Performance of North Dakota RLECs

Data were provided by nine RLECs with which to calculate four representative financial ratios, including three leverage ratios and one liquidity ratio (Table 2). Data are based on each firms' financial statements at the end of fiscal year 2010.

Table 2. Selected Financial Ratios of North Dakota RLECs in 2010

	Average	Standard Deviation
TIE ratio	5.0	3.9
Debt to equity ratio	1.4	0.9
Debt to assets ratio	0.4	0.1
Current ratio	1.9	0.7

Leverage ratios suggest how and how much debt a firm is using. Debt allows the RLEC to fund activities beyond what equity capital alone allows. The times interest earned (TIE) ratio measures how capable a firm is of paying its interest obligations, given how much profit it makes. The 2010 year end average for the nine RLECs was 5.0, indicating the RLEC had five dollars of profit for every dollar of interest it must pay. A standard deviation of 3.9 indicates a range of ability to repay interest among North Dakota RLECs. Two firms reported TIE ratios less than 2.0.

The debt to equity ratio indicates how many dollars of debt a firm has for each dollar of equity. The 2010 year end average for the nine North Dakota RLECs was 1.4, with a standard deviation of 0.9. This indicates the typical North Dakota RLEC may have \$1.40 of current and long term debt for every dollar of equity. A standard deviation of 0.9 indicates there is a range of leverage conditions across RLECs. Similar to the debt to equity ratio, the debt to asset ratio

indicates how many dollars of debt the firm has for each dollar of assets. The 2010 year end average for the nine RLECs was 0.4, with a standard deviation of 0.1.

The current ratio describes a firms' ability to meet all its financial obligations, including payroll, accounts payable, taxes, and so forth. The current ratio compares a company's current assets and current liabilities, meaning assets and liabilities that can be converted into (assets) or paid as (liabilities) cash within a year. Although the author is unaware of the average current ratio in the telecommunications industry, a statewide average current ratio of 1.9 suggests sufficient cash to pay obligations, but that the average firm is using available cash.

3.6 Summary

North Dakota RLECs provide reliable telecommunications services to a geographically dispersed population. They also receive support from the Federal Universal Service Fund. North Dakota RLECs use USF funds, together with control of operations, to maintain acceptable leverage and liquidity ratios. However, these are only some of the direct economic contribution of the RLECs. As illustrated in the next section, the secondary contribution of RLECS to the state economy is also substantial.

Section 4: Economic and Fiscal Contributions

The economic contribution of North Dakota RLEC operations goes well beyond firm-level spending on employee compensation, purchases, and taxes. They also reflect the strong stimulus that operations provide to key measures of economic activity—the value of telecommunications service production, employment and labor income—in the state economy. North Dakota RLEC spending lifts economic activity throughout North Dakota. This effect is experienced by the private sector through increased sales and employment, and by the public sector through increased tax revenues to support public services. Estimates of these effects were

developed by applying the Impact Analysis for Planning (IMPLAN) model to gross sales data provided by North Dakota RLECs. (For more information on IMPLAN, see Section 2.)

4.1 Rural Local Exchange Carrier Revenues and Expenditures in North Dakota

Estimated North Dakota RLEC expenditures in North Dakota totaled more than \$175 million in 2010 (Table 3). Spending within the state represented 68 percent of the RLECs’ total spending.

Table 3. RLEC Expenditures in North Dakota

Product Category	Estimated Amount
Telephone (net of payroll)	\$63,000,000
Video (net of payroll)	\$6,400,000
Broadband (net of payroll)	\$13,000,000
Other (net of payroll)	\$27,000,000
Payroll	\$66,000,000

Payroll expenses accounted for the largest input expenditure made by North Dakota RLECs within the state, with total compensation reaching \$66 million, approximately 37 percent of the RLEC’s expenditures in the state. Since all but one of the RLECs are headquartered in North Dakota, and approximately 90% of RLEC employees are assumed to live in North Dakota, a large portion of RLEC labor expenditures (employee benefits, salaries and wages) stay “home” in the state.

4.2 RLEC Expenditures outside North Dakota

Estimated RLEC expenditures for products and services (including labor) purchased outside North Dakota totaled \$53 million in 2010, approximately 32 percent of total spending. These were largely for specialized products and services unique to the telecommunications industry.

4.3 State and Federal Taxes

North Dakota RLECs also generate substantial tax revenue. The RLECs generated an estimated \$31 million in total state tax revenue in 2010, including more than \$26 million in corporate income and use tax revenues. The RLECs generated nearly \$20 million in federal tax revenue in 2010 (Table 4).

Table 4. Fiscal Contributions of RLECs Operating in North Dakota in 2010

Description	Amount
Federal Government	
Payroll Tax	\$12,800,000
Corporate Income and Business Tax	\$2,300,000
Personal Tax	\$3,500,000
Total	\$18,600,000
State Government	
Payroll Tax	\$2,000,000
Corporate Income and Business Tax	\$26,000,000
Personal Tax	\$3,300,000

Total	\$31,000,000
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4.4 Economic Contribution to North Dakota Economy

Summary economic contributions for North Dakota—are presented in Table 5. The three economic contribution variables are:

- employment—measured in jobs provided
- labor income—the earnings of labor
- output—the value of production of goods and services

These economic contributions encompass both direct and secondary effects. The direct effects reflect the industry-sector and geographical distribution of North Dakota RLEC spending without any subsequent spending effects. The secondary effects include subsequent spending effects and are divided into two types: indirect and induced. Indirect effects reflect how the firm’s spending patterns alter subsequent spending patterns among suppliers. Induced effects reflect how changes in labor income influence the final demand for goods and services, which then has an effect on all sectors producing basic, intermediate and final goods and services.

The direct effects are based on the gross business sales generated from RLECs of \$222 million in 2010. This value—which is divided among consumer benefits, investor returns, infrastructure purchases, salaries and taxes—reflects the total output of products and services associated with North Dakota RLECs. The total contribution of RLECs on the North Dakota economy is \$323 million. Thus, the total output multiplier for RLECs operating in North Dakota is 1.45 (or \$323 million divided by \$222 million). This indicates that for every \$1.00 of gross business sales from the RLECs, the North Dakota economy produces \$1.45.

Table 5. Economic Contribution of RLECs to the North Dakota Economy in 2010

	Employment	Labor Income	Total Output
Direct	1,100	74,000,000	222,000,000
Secondary	800	30,000,000	101,000,000
Total	1,900	104,000,000	323,000,000

4.5 Economic Impacts on Local Industry

An RLECs’ economic contribution spreads over several economic sectors. Although the direct effects are concentrated in the telecommunications sector, the secondary effects—and especially the induced effects—increase the dispersion of economic contributions across other sectors. Table 6 presents the 10 sectors most affected by the RLECs in North Dakota, based on the number of jobs created. Within the telecommunications expenditure sector are purchases of equipment, which the RLECs acquire from local retailers and merchants whenever possible. The other sectors most affected by the RLECs relate to goods and services required by the firms’ employment base, including wholesalers, hospitals, medical and dental practices, and insurance providers. Indirect spending by firm employees boosts the sales and work forces of these industries, typically operated by local small-business owners. The prevalence of service sectors illustrates heavy reliance by RLECs on local labor and vendors to provide services for their operations and employees, including healthcare, construction, design, and consulting services.

Table 6. Ten North Dakota Economic Sectors Most Affected by RLEC Expenditures in 2010

Description	Jobs	Total Compensation	Total Output
Telecommunications	1,100	78,000,000	234,000,000
Food services and drinking places	80	1,300,000	4,000,000
Real estate establishments	40	300,000	2,900,000
Offices of physicians, dentists, and other health practitioners	30	2,000,000	3,600,000
Private hospitals	30	1,600,000	3,600,000
Architectural, engineering, and related services	20	1,300,000	2,400,000
Nursing and residential care facilities	20	600,000	1,100,000
Retail Stores - Food and beverage	20	400,000	800,000
Motion picture and video industries	20	300,000	1,800,000
Retail Stores - General merchandise	20	400,000	800,000

4.6 Summary

North Dakota RLECs make a substantial economic contribution to the North Dakota economy. Like other RLECs, North Dakota RLECs buy many specialized products and services not available in state economies. National and international markets typically provide these products and services. Nevertheless, the statewide economic effects of the RLECs are substantial, largely because of the buying power created by high RLEC employee compensation. In turn, RLEC employees buy goods and services provided locally. This spending supports many small businesses in the area.

Section 5: Effect of Reduced Federal Universal Service Funding on Economic Contribution of North Dakota Rural Local Exchange Carriers

5.1 Primary Effects of Reduced Federal Universal Service Funding

Rural Local Exchange Carriers (RLECs) operate in a dynamic environment that recognizes and responds to changes from outside the firm. Changes to the Federal Universal Support funding, as proposed by the National Broadband Plan, may influence the investments, expenses and overall business plans of North Dakota RLEC entities. RLEC executives were asked to identify and briefly describe what they considered to be the most critical or important issues faced by RLECs for each of the possible changes in federal policy: one, reduced or eliminated ICC rates; two, complying with COLR requirements with reduced FUSF support; three, limitations on operating and capital expenditure recovery; and four, reverse auctions for receipt of FUSF support. Common themes were identified among the responses, suggesting that the respondents believe the effects of these issues on RLEC operations are interrelated. Among these were:

1. Negative effects on RLEC employment, including reduced ability to train, develop, and retain a qualified workforce
2. Imposition of cost cuts and associated impacts on service quality
3. Decreases in plant investment in order to maintain cash flow
4. Reduced profitability
5. Increased difficulty in meeting loan interest payments, and
6. Decreased ability to be responsive to service and product innovation requests.

The telecommunication economics literature suggests two further changes that reduced federal universal service funding may cause in North Dakota RLEC operations. First, Gideon

and Gable (2011) show that a 0.1% change in federal high-cost support could lead to a 2% decline in phone penetration in North Dakota. North Dakota was one of nine states showing a positive relationship between percentage changes in federal high cost support and percentage change in household telephone penetration between 2003 and 2005. North Dakota was the only state with a statistically significant increase in household telephone penetration during this period. Second, elasticity is a measure of the relationship between changes in price and changes in quantity demanded. Although price and quantity of telephone usage were not collected for this report, a variety of elasticities of demand have been estimated for various numbers of minutes of telephone service (Goel, 2009), suggesting that consumers are sensitive to price in selecting the number of minutes of service consumed.

5.2 Possible Effects of Reduced Federal Universal Service Funding on Economic Contribution of RLECs to North Dakota Economy

The precise mechanism by which changes in federal universal funding support will affect the operations of RLECs is unknown. The six thematic responses listed in section 5.1 suggest mechanisms by which the economic contribution of RLECs to the North Dakota economy may change is support funding changes. To that end, three scenarios were devised which apply these responses. First, many of the North Dakota RLECs operate as cooperatives, paying pro rata shares of their net income to their users (Responses 4 and 5). The case in which these no longer pay income shares to their users was considered. Second, the RLECs are assumed to receive reduced levels of federal universal funding support, which are assumed to affect the average compensation of RLEC employees but not RLEC revenues. This assumes that RLECs will be able to offset decreases in support with increases in price, without any effect on quantity of service demanded (Responses 1, 2, and 3). Third, the RLECs are assumed to receive reduced

levels of federal universal funding support, affecting the total payroll expenses, number of employees, and RLEC revenues. This scenario assumes the RLECs are unable to completely offset the decrease in federal universal funding support with increases in price (Responses 1, 2, and 3). The economic effect of these scenarios varies from almost none (Case 1) to substantial effects on the gross economic value, employment, and taxes generated in the North Dakota economy (Cases 2 and 3).

Case 1. RLECs Cease Payment of Patronage Refunds

Consistent with cooperative principles, cooperatively-owned RLECs returned an estimated \$6.1 million of net income to users in 2010. In this scenario, it is assumed RLECs offset reductions in federal universal service funding by reducing net income to zero and raising prices such that no revenue is lost. Given the degree of rounding used in this analysis, this scenario creates essentially no effect on the economic contribution of RLECs to the North Dakota economy.

Case 2. RLECs Reduce Payroll Expenses and Workforce

In 2010, North Dakota RLECs employed approximately 1,100 people on a full time basis, paying approximately \$74,000,000 in compensation (Table 5). In this scenario it is assumed federal universal service funding has been reduced. As a result, RLEC employees is reduced from 5% to 54%. It is assumed gross business sales remain constant through price increases or other means. Furthermore, it is assumed cooperatively owned RLECs offset reductions in funding by eliminating allocations of net income to users. This is an intermediate—and unlikely—case since it is likely that the number of employees would be kept constant if gross business sales can remain unchanged. Instead, this scenario suggests the incremental change in RLEC economic contribution when payroll expenses are reduced.

Table 7 shows the direct, secondary, and total economic contribution of RLECs when total payroll is 95%, 90%, 85%, 80%, 75% and 46% of the estimated 2010 payroll for all North Dakota RLECs. Note that since the RLECs reported that 54% of all revenue comes from USF support, a case is considered wherein it is assumed 54% of all gross business sales are lost. This will overstate the effect of losing all revenue since employee compensation is not the only expense incurred by RLECs. Alternatively, since 44% of average RLEC revenue generated within North Dakota is related to residential or commercial telephone service, a loss of 54% of 44% is a loss of approximately 25% of gross sales. Hence, a case wherein RLECs generate 75% of 2010 gross sales is considered. All other cases are presented for purposes of comparison.

Table 7. Economic Contribution when RLECs Incur Payroll and Workforce Expenses at Various Percentages of 2010 Levels

	95%	90%	85%	80%	75%	46%
Direct	\$219,600,000	\$219,600,000	\$219,600,000	\$219,600,000	\$219,600,000	\$219,600,000
Secondary	\$100,500,000	\$98,500,000	\$96,400,000	\$94,400,000	\$92,400,000	\$80,600,000
Total	\$320,100,000	\$318,100,000	\$316,000,000	\$314,000,000	\$312,000,000	\$300,200,000
Difference						
of total, relative to	-0.9%	-1.5%	-2.1%	-2.7%	-3.4%	-7.0%

Table 5

The total output multiplier for RLECs in this Case is 1.4 (or \$300 million divided by \$219 million). Hence, for every \$1.00 of gross sales from the RLECs, the North Dakota economy produces \$1.40. This is less than the multiplier in section 4.4.

In this scenario, since individual firm revenue is held constant, only the secondary economic contribution of RLECs is affected by reduced employment and payroll expenses. This

occurs because fewer employee households are able to make purchases in the state economy. Reductions in total economic contribution should be compared with the 2010 economic contribution of \$323 million reported in section 3.4. Hence, this case suggests reductions in total RLEC economic contribution of between less than 1% to a maximum of 7%.

The reduced secondary economic contribution also changes the tax base to state and federal governments. Table 8 displays the estimated taxes resulting from RLEC operations in North Dakota when RLECs pay 95%, 90%, 85%, 80%, 75% and 46% of estimated 2010 payroll expenses. These indicate taxes generated for the North Dakota state government by virtue of RLEC operations may decline between 1% and 13%, and between 4% and 40% for the federal government. In this case, reductions in federal taxes are greater than reductions in North Dakota state taxes.

Table 8. State and Federal Fiscal Contributions when RLECs Incur Payroll and Workforce Expenses at Various Percentages of 2010 Levels

		95%	90%	85%	80%	75%	46%
State	Payroll Tax	\$1,900,000	\$1,800,000	\$1,700,000	\$1,700,000	\$1,600,000	\$1,100,000
	Corporate						
	Income and	\$25,700,000	\$25,600,000	\$25,450,000	\$25,350,000	\$25,200,000	\$24,350,000
	Business Tax						
	Personal Tax	\$3,200,000	\$3,000,000	\$2,900,000	\$2,800,000	\$2,600,000	\$1,800,000
	Total	\$30,800,000	\$30,400,000	\$30,050,000	\$29,850,000	\$29,400,000	\$27,250,000
Difference of							
total, relative to		-1.1%	-2.4%	-3.5%	-4.2%	-5.6%	-12.5%
Table 4							
Federal	Payroll Tax	\$12,300,000	\$11,800,000	\$11,200,000	\$10,700,000	\$10,100,000	\$7,000,000

Corporate						
Income and	\$2,350,000	\$2,300,000	\$2,300,000	\$2,300,000	\$2,300,000	\$2,250,000
Business Tax						
Personal Tax	\$3,300,000	\$3,200,000	\$3,000,000	\$2,900,000	\$2,800,000	\$1,900,000
Total	\$17,950,000	\$17,300,000	\$16,500,000	\$15,900,000	\$15,200,000	\$11,150,000
Difference of						
total, relative to	-3.5%	-7.0%	-11.3%	-14.5%	-18.3%	-40.1%

Table 4

These changes in RLEC operations also affect the economic contribution of RLECs to the North Dakota workforce. Table 9 shows the changes in direct, secondary, and total employment contributed by RLECs within North Dakota for various changes in payroll.

Table 9. Employment Contribution when RLECs Incur Payroll and Workforce Expenses at Various Percentages of 2010 Levels

	95%	90%	85%	80%	75%	46%
Direct	1,100	1,000	900	900	800	500
Secondary	800	800	800	800	800	700
Total	1,900	1,800	1,700	1,600	1,600	1,100
Difference of						
total, relative to	0.0%	-5.3%	-10.5%	-15.8%	-15.8%	-42.1%

Table 5

Case 3. RLECs Reduce Employee Workforce Size and Revenue

In 2010, North Dakota RLECs employed approximately 1,100 people on a full time basis, paid approximately \$74,000,000 in employee compensation, and generated approximately \$222 million in gross business sales. In this scenario, it is assumed federal universal service funding

has been reduced, that payroll expenses decline as a result, and that RLEC gross sales decline in proportion with declines in payroll expense. Furthermore, it is assumed that cooperatively owned RLECs offset USF reductions with net income that would have been distributed to users. This is an extreme case relative to the discussion in section three since it may be possible for RLECs to offset reduced USF support to RLEC gross sales by price increases. Table 10 shows the direct, secondary, and total economic contribution of RLECs when total payroll and gross sales are 95%, 90%, 85%, 80%, 75% and 46% of the estimated 2010 levels for all North Dakota RLECs.

Table 10. Economic Contribution when RLECs Incur Payroll and Workforce Expenses, and Generate Lower Gross Sales, at Various Percentages of 2010 Levels

	95%	90%	85%	80%	75%	46%
Direct	\$204,700,000	\$193,900,000	\$183,100,000	\$172,400,000	\$161,600,000	\$99,100,000
Secondary	\$96,200,000	\$91,200,000	\$86,200,000	\$81,100,000	\$76,000,000	\$54,500,000
Total	\$301,000,000	\$285,100,000	\$269,300,000	\$253,500,000	\$237,600,000	\$153,700,000
Difference of						
total, relative	-6.8%	-11.7%	-16.6%	-21.5%	-26.4%	-52.4%

to Table 5

The total output multiplier for RLECs in this Case is 1.6 (or \$154 million divided by \$99 million). This indicates that for every \$1.00 of gross sales from the RLECs, the North Dakota economy produces \$1.60, larger than the multiplier in section 4.4.

In this scenario, since individual firm gross sales and payroll expenses are decreased, the direct and secondary economic contributions are reduced. This occurs because fewer purchases made by RLECs are entering the economy and fewer employee households are able to make purchases in the local economy. Reductions in total economic contribution should be compared

with the 2010 economic contribution of \$323 million reported in section 3.4. Hence, this case suggests a reduced RLEC economic contribution of between 7% and 52%.

The reduced direct and secondary also reduces the direct and indirect tax base to state and federal governments. Table 11 shows the estimated taxes generated at 95%, 90%, 85%, 80%, 75% and 46% of the estimated 2010 gross sales and payroll expenses. These estimates indicate taxes generated for the North Dakota state government could decline between 10% and 50%, and between a 5% and 39% decline in federal taxes resulting from reduced RLEC payroll in North Dakota. Allowing gross sales to decline shows how sensitive state taxes are to this value, as this scenario shows larger declines in North Dakota state taxes than federal taxes.

Table 11. State and Federal Fiscal Contributions when RLECs Incur Payroll and Workforce Expenses, and Generate Lower Gross Sales, at Various Percentages of 2010 Levels

		95%	90%	85%	80%	75%	46%
State	Payroll Tax	\$1,900,000	\$1,800,000	\$1,700,000	\$1,600,000	\$1,500,000	\$1,200,000
	Corporate						
	Income and	\$24,150,000	\$22,850,000	\$21,650,000	\$20,350,000	\$19,100,000	\$12,300,000
	Business Tax						
	Personal Tax	\$1,900,000	\$1,800,000	\$2,800,000	\$2,700,000	\$2,500,000	\$2,100,000
	Total	\$27,950,000	\$26,450,000	\$26,150,000	\$24,650,000	\$23,100,000	\$15,600,000
Difference of							
total, relative to		-10.3%	-15.1%	-16.1%	-20.9%	-25.8%	-49.9%
Table 4							
Federal	Payroll Tax	\$12,200,000	\$11,600,000	\$10,900,000	\$10,300,000	\$2,600,000	\$8,100,000
	Corporate						
	Income and	\$2,250,000	\$2,050,000	\$2,000,000	\$1,850,000	\$1,750,000	\$1,050,000
	Business Tax						

Personal Tax	\$3,300,000	\$3,100,000	\$2,900,000	\$2,800,000	\$2,600,000	\$2,200,000
Total	\$17,750,000	\$16,750,000	\$15,800,000	\$14,950,000	\$6,950,000	\$11,350,000
Difference of						
total, relative to	-4.6%	-9.9%	-15.1%	-19.6%	-62.6%	-39.0%

Table 4

Reductions in RLEC gross sales and payroll expenses affect the economic contribution of RLECs to the North Dakota workforce. Table 12 shows the changes in direct, secondary, and total employment contributed by RLECs within North Dakota for various changes in these two variables.

Table 12. Employment Contribution when RLECs Incur Payroll and Workforce Expenses, and Generate Lower Gross Sales, at Various Percentages of 2010 Levels

	95%	90%	85%	80%	75%	46%
Direct	1,100	1,000	900	900	800	500
Secondary	700	700	700	700	600	500
Total	1,800	1,700	1,600	1,500	1,400	1,000
Difference of						
total, relative	-5.3%	-10.5%	-15.8%	-21.1%	-26.3%	-47.4%

to Table 5

5.3 Possible Effects of Reduced Federal Universal Service Funding on RLEC Financial Performance

All firms must decide what combination of equity and debt capital to use in making investments and conducting operations. An appropriate mix of both allows a firm to take advantage of business opportunities and relieves the equity-holders of the requirement to supply all the necessary capital for the firm. All nine firms providing data for this report indicated debt

capital was used in their operations. In 2010, these nine firms paid over \$7 million in interest expenses.

Banks and other lenders examine ratios such as debt-to-asset and the TIE ratio in order to form and opinion about whether a company will be able to pay back a loan. They may also assess a firm's financial health by observing the current ratio, which gives an indication of the firm's supply of cash compared with its current liabilities. One of the key issues cited by respondents to the data survey used to construct this report was the reduction in plant investment in order to preserve cash flow (Response 3). To the extent existing physical assets are replaced at reduced rates, existing assets depreciate, and debt is used to offset reduced federal universal service funding, then average RLEC debt-to-asset ratios may increase and TIE ratios may decrease. This may reduce the willingness of lenders to provide operating or long term loans.

5.4 Real options

Real options theory approximates the dynamics of the managerial behavior by allowing for flexibility in future manager decisions. Real options models apply analytical methods to represent these behaviors and generate valuations for the ability to make typical decisions in the future. Although generating estimates of these values is beyond the scope of this report, it should be noted that, to the extent changes in federal universal service fund support affect the ability of managers to take advantage of decisions future investment opportunities, the IMPLAN method underestimates the magnitude of the economic effects of decreased funding to North Dakota RLECs. Examples of these decisions include the option to delay a project, to reduce operations, to use alternative technologies depending on input prices, or a chance to expand scale.

5.5 Effect of Changes in Federal Universal Service Funding on Other RLEC Contributions to the North Dakota Economy

In addition to the economic contribution of RLECs to the North Dakota economy, they enhance the community in ways difficult to capture with these measures of jobs and gross output. RLECs tend to be significant contributors to their surrounding communities because they often exist to satisfy the need for telecommunications services that would not be provided by any other firm. They also are committed to the communities where they conduct business. Furthermore, RLECs provide critical infrastructure which enables other forms of commerce to take place.

North Dakota RLECs have long recognized their commitment to the communities where it conducts business. An RLEC's duty as a good corporate neighbor extends beyond operations to daily involvement in the community, as many of its employees live within the same county as the corporate headquarters. RLECs serve as the carrier of last resort. They provide critical infrastructure for conducting forms of commerce other than telecommunications services. RLECs incorporated as cooperatives also return net income to customers and reinvest it into infrastructure improvements. Representative accounts of these and other benefits generated by RLECs are provided below.

Account 1. "If a strong telecommunications infrastructure is not in place for customers in rural areas it would detrimental to not just the rural economy, but to the way of life of rural customers. Opportunities for people to be employed in a rewarding, high quality job would be hampered. We have two computer programmers living in our community who are work out of their homes for companies located a great distance away, in large, urban communities. They both have good paying jobs with good benefits and they are strong, productive members of community. They have 6 children total between the two families who attend our local school,

along with the entire families being active in community organizations, churches, and so forth. Without the broadband capability provided to them by our company it would be impossible for them to live here in our rural community where they get the benefit of the quality of life they choose along with a rewarding career. These are just two families that we know of, but there are countless other stories like these in our serving territory. Without proper use of the USF funds that we receive to deploy and maintain our infrastructure, these people would not be here, along with many others just like them.”

Account 2. “The expansion of ‘Fiber to the Home’ (FTTH) to rural areas in several exchanges in our service area have provided the needed broadband speeds to allow the expansion/creation of SMB's in our rural portions of our service area. Previously these areas were only able to receive broadband speeds up to about 700k and we are now able to offer 6Meg service and higher broadband speeds, if required. The availability of FTTH capabilities in rural areas has allowed ‘mancamps’ and oilfield service companies to expand operations in the Bakken oilfield and allow the companies to explore for oil and reduce the nation's dependence on foreign oil and has created tens of thousands of new jobs in the new oilfield discovery in North Dakota. Broadband facilities have made it possible for major companies to monitor facilities and provide communications from the Bakken oilfield area. The FTTH infrastructure also provides the backbone to transport the large amount of cellular traffic from the large number of workers from all over the US.”

Account 3. “In the past five years support from the Federal Universal Service Fund has greatly affected the quality of life in Reservation Telephone Cooperative's (RTC) service area. In 2008, RTC began our pilot fiber-to-the-home project to residential areas of the Fort Berthold Indian Reservation. Since then, we have completed FTTH projects in the following exchanges:

Emmet, Garrison, New Town, Kenmare, Mandaree, Norma, Parshall, Plaza, Ross, Spencer, Watford City, and White Shield. We continue to plow FTTH in additional areas. FTTH has many benefits. Fiber requires less maintenance than copper cable. It provides additional bandwidth, which will allow RTC to offer higher internet speeds, and it allows RTC to offer video service in new areas. Fiber will also allow RTC to offer additional services in the future. Without the Federal Universal Service Fund we would not have been able to accomplish our FTTH projects.”

Account 4. “In recent years, western North Dakota has experienced an oil boom, which in turn has created an increased demand for RTC's voice, data, and video services. We are working hard to get services to residential customers moving into established homes, new residential areas that are newly established, temporary residential housing for oil-related company employees, well sites, oil-related company offices, etc. Without the Federal Universal Service Fund, we would not be able to get service to all of these new businesses and residences, which would make the area less attractive to move to having a negative impact on the economy.”

Account 5. “Without the Residual Mechanism (RM) being incorporated into the ICC reduction, we would see substantial decreases in the revenues that we receive. The only way to accommodate the decreased revenues would be through employee reductions as our net margins would not be able to absorb the full amount of the reduced revenues.

Our company is currently under the capped corporate expense amount. Therefore, if the FCC would cap all three funds instead of just the high cost fund, there would be no effect on us. However, if they eliminate corporate expenses that would be another matter and we would see significant reductions in revenue.

Our company will be 100% fiber by the end of the first quarter 2012 so we have the ability to serve our subscribers with unlimited bandwidth going forward. We also hold 700 Mhz,

AWS and BRS licenses so we have a fair amount of spectrum to utilize. I believe the release of additional spectrum would probably affect us most through other companies obtaining the spectrum and competing against us.”

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