REDACTED

OCTOBER 22, 2021

Expert Report

Regarding LTD Broadband's Request for ETC Designation in South Dakota

PREPARED FOR SOUTH DAKOTA TELECOM ASSOCIATION

SDTA Exhibit 2

PREPARED BY

Larry D. Thompson, PE
Chief Executive Officer
Vantage Point Solutions

VANTAGEPNT.com 605-995-1777
2211 N Minnesota Street Mitchell SD 57301

Table of Contents

Expert Report of Larry D. Thompson

1. Introduction

I have been asked by the South Dakota Telecommunications Association (SDTA) to provide an Expert Report in the South Dakota Public Utilities Commission (SDPUC) Docket TC21-001.[1] My background, qualifications, expert witness experience, testimony experience, the scope of this assignment and a list of the materials I reviewed in preparing this report are all outlined in my prefiled written testimony filed with the SDPUC in Docket TC21-001.

2. Technical Analysis

LTD Broadband bid in the Gigabit Performance Tier with Low Latency in all areas in South Dakota where they were the provisional winner of the RDOF Phase I Auction. The Gigabit Performance Tier requires the delivery of at least 1 Gbps download and 500 Mbps upload (1 Gbps/500 Mbps) with a 2 TB monthly usage amount.[2] In addition, Low Latency bids require a latency of less than 100 ms at least 95% of the time.[3] The areas where LTD Broadband was the provisional winner in the RDOF Phase I Auction can be seen in Exhibit LT-E1.

[1] *In the Matter of the Application of LTD Broadband LLC for Designation as an Eligible Telecommunications Carrier for Purposes of Receiving Federal Universal Service Support*, Docket No. TC21-001, Filed January 07, 2021
[2] *In the Matter of Rural Digital Opportunity Fund, Connect America Fund*, FCC Report and Order, WC Docket No. 19-126 and 10-90, Released February 7, 2020 ("RDOF Order") ¶31
[3] RDOF Order ¶32

LTD Broadband's Long Form filing with the FCC,[4] showed generic diagrams to describe its broadband deployment in the various states where it was the provisional winner[5] of RDOF Phase I Auction funding. LTD Broadband has not provided any South Dakota specific network diagrams. These generic diagrams showed a combination of wireline (fiber) and wireless technologies that will be used to serve their RDOF customers. Through the discovery process, LTD stated that their intention was to serve all customers in South Dakota using fiber to the end user customer. Because of this, I will focus my effort on wireline fiber technologies. In addition, LTD Broadband stated that they will use buried construction techniques rather than aerial for their fiber deployment.

As described in my direct testimony, it was clear from LTD Broadband's response to both SDPUC Staff Data Requests and to SDTA Data Requests that LTD Broadband has no plans to use wireless technologies in the last mile or middle mile to serve their RDOF customers. LTD Broadband proposes to serve its RDOF locations in South Dakota using a FTTH network.

We will focus our attention on three aspects of the FTTH design only. These are:

1. LTD's Experience with FTTH
2. The technology that is proposed to be used
3. The installation and construction costs to deliver the broadband service.

Based on these three areas, we can determine if the LTD deployment is practical from a technical and economic perspective.

[4] Provided by LTD Broadband as part of the discover process in this case and marked "Confidential – Attorneys' Eyes Only"
[5] We will refer to LTD Broadband as the "provisional winner" since the FCC has not yet awarded any of the RDOF areas to them even where they were the low bidder.

2.1. LTD Broadband's Fiber-to-the-Home Experience

Building, operating, and maintaining a FTTH network requires unique and specialized expertise. By LTD's own admission, they do not have any customers on FTTH technology in South Dakota.[6] Even when referring to LTD Broadband's website showing their services available,[7] there is no mention of any services above 35 Mbps (the "Home Office" plan) although they claim to have speeds of up to 10 Gbps available, but this is for business users and has customized pricing.[8]

In SDTA's fifth data request, LTD Broadband claimed to have 448 FTTH customers in Tennessee. This is 10% of the RDOF customers in South Dakota and a small fraction of the more than half million RDOF customers nationally. Providing service to more than 528,000 customers nationally would be a challenge for even an established FTTH provider, much less one that very little FTTH experience.

Given LTD Broadband's admission to having no FTTH customers in South Dakota which is further supported by its website, LTD Broadband has never designed, deployed, or operated a FTTH network of the magnitude and scale as they are proposing for South Dakota. Because of this, there is no history to determine if the installed network would meet all local, state, or national safety standards nor do we know if LTD has the expertise to secure all environmental studies and permits. LTD admitted to not having any experience obtaining federal or tribal permits as will be required for their RDOF deployment in South Dakota. Also, an improperly grounded, bonded, and installed FTTH network can pose a threat to public safety. To my knowledge, LTD has no track record in securing the required permits, satisfying local, state, and national safety standards, nor operating a network of this size. None of the construction details have been provided by LTD Broadband nor provided to the FCC in its filed long form.

[6] [redacted]

[7] See LTD Broadband's response to SDPUC Staff's First Data Request, #3.

[8] https://ltdbroadband.com/plans (Accessed September 23, 2021). Also see LTD Broadband's response to SDPUC Staff First Data Request 6b.

2.2. Fiber-to-the-Home Technology

LTD Broadband's response to SDTA's First Set of Discovery, Request 6 stated, "LTD Broadband's GPON deployment will be engineered to support at least 1 Gbps/500 Mbps service to all locations within each census block group for which RDOF funds were awarded." GPON technology is standardized by the ITU as G.984 and stands for "Gigabit-capable Passive Optical network." The standards for GPON were ratified by the International Telecommunications Union (ITU) between 2003 and 2008 and it is a mature technology. A GPON architecture involves connecting a single fiber in the central office or cabinet to multiple many fibers in the field used to connect to the customer premises. Devices called "splitters" are used to passively (no powering or electronics) split/combine the optical signal on the fibers to/from the customer premises to the single fiber connected to the central office equipment.

GPON consists of electronics in a central office or cabinet referred to as the Optical Line Termination (OLT) that connects to electronics at a customer premise called the Optical Network Termination (ONT). Each fiber connected to an OLT port in the central office can serve multiple customers using passive (no power required) optical splitters. [redacted] The fiber distance between the OLT and the ONT can be up to 12.4 miles (20 km) or farther by using longer range OLTs.

[redacted]. All customers on a PON share the available capacity. Because of its limited and shared capacity, GPON is not well-suited to deliver gigabit services to end user customers. In its RDOF Long Form, LTD Broadband argues that [redacted].[9] However, oversubscription relies on the laws of large numbers and only makes sense when the network capacity is significantly more than the capacity offered the customer. One can see that it takes only 3 customers to each be using 1 Gbps to exceed the capacity of the entire downlink of a GPON. Because of this, many companies offering Gigabit services have migrated to more modern technologies such as XGS-PON or NG-PON2. It is generally not considered a good long-term strategy to deploy a GPON network in areas where gigabit services must be delivered today or in the near future. If LTD Broadband's costs were based on GPON

[9] Auction 904 Long-Form Stage II Detailed Technical Submission, Item 1.

electronics, it is likely that significant additional investment will be needed to replace the OLTs and ONTs within a couple of years to meet the increasing customer demand.

2.3. FTTH Construction Costs

Since LTD provided no detailed network diagrams for the FTTH networks to be built in South Dakota, I was unable to analyze the specific design in eight areas where they were the successful RDOF bidder. These eight areas were:

1. Rapid City Area (includes Black Hills)
2. Timber Lake Area
3. Watertown Area
4. Pierre Area
5. Miller Area
6. Sioux Falls Area
7. Rosebud Area
8. Yankton Area

Vantage Point has extensive experience in engineering and project managing hundreds of FTTH networks across the state of South Dakota and across the nation. This experience makes us uniquely qualified to assess the feasibility of LTD Broadband's network. Since we do not have detailed network diagrams, I will use the capital expense information provided by LTD Broadband to determine if its network will be adequate to serve the locations in their RDOF area. After analysis, I have found that LTD Broadband's estimated network construction costs have been grossly underestimated based on my experience with FTTH construction in South Dakota. Because of this, it is likely that LTD Broadband is unprepared to meet the FCC's buildout requirements either economically, managerially, or technically.

LTD Broadband's financial analysis shows that it will take approximately [redacted] to deploy a network capable of serving all the FCC locations in their RDOF service areas in South Dakota. This network includes the following:

1. The ability to serve all RDOF locations including those that don't currently subscribe (except for the drop) by the end of year 6.[10]
2. All central office electronics, customer premise electronics, and local loop fiber (drops) to provide broadband service to [redacted] of the RDOF locations by the end of year 6.[11]

[10] LTD Broadband's response to the Second Data Request from Commission Staff (Request 2-6).
[11] Per the LTD proforma that was included in their FCC Long Form application, page 2 of application.

3. All middle-mile and backhaul facilities needed to transport the broadband signal to the Internet Connection Point in Sioux Falls.
4. All core network equipment and routers needed for the network.
5. Any buildings, huts, permits, environmental studies, and rights-of-way (ROW) needed to place the cable, cabinets, and electronics.
6. Any home installation and wiring required

Based on the financial analysis provided by LTD Broadband, they believe that the cost of all the above capital expenses (CapEx) is approximately [redacted] per location ([redacted] of which have subscribed to LTD Broadband's service at the end of year 6). This is determined by dividing the total investment over 6 years (when the network is completely built out) which is approximately [redacted] by the total number of RDOF locations in South Dakota (7,481).

For each of the eight regions where LTD Broadband was the apparent RDOF winning bidder, I analyzed the estimated the cost of construction for a network that matches what is planned by LTD Broadband at the end of year 6.[12] To determine the construction costs, we did not engineer to each specific RDOF location, but instead determined the average cost to construct fiber to a typical location in each of the regions based upon previous construction projects and engineering projects we have performed in recent years in the same region.[13] Based on this approach, the construction estimates and typical cost per location is shown in Table 2-1. As part of this estimate, we have included the costs of connecting the last mile fiber in each of the RDOF census blocks back to the closest community where LTD Broadband could potentially find a backhaul provider to carry their traffic to the Internet connection point in Sioux Falls. It should be noted that no costs have been included in my estimate for the backhaul facilities from the aggregation points to Sioux Falls.

[12] Per FCC rules, at the end of year 6 LTD broadband must have their network built such that they can deliver service to any RDOF customer within 10 days. LTD Broadband (and VPS) believe this would be the entire network except the fiber drop to the customer. LTD Broadband also assumes that [redacted] of the RDOF customers will subscribe to their service ([redacted] penetration rate).

[13] In the last 4 years, Vantage Point has done 35 FTTH projects totaling 7,000 miles of construction in South Dakota alone. Vantage Point has engineered and provided construction management for FTTH projects in all regions of the state where LTD Broadband was the apparent RDOF Phase I Auction winner.

Region	Construction Estimate	Locations	Cost Per Location
Rapid City Area (includes Black Hills)	$46.0M	4,020	$11,570
Timber Lake Area	$11.7M	521	$22,591
Watertown Area	$5.6M	641	$8,830
Pierre Area	$2.2M	86	$26,163
Miller Area	$5.3M	339	$15,693
Sioux Falls Area	$5.7M	537	$10,726
Rosebud Area	$4.4M	169	$25,799
Yankton Area	$9.2M	1,168	$8,039
Total for LTD in SD	**$91.0M**	**7,481**	**$12,167**

Table 2-1. Vantage Point Construction Estimate

As a comparison, Table 2-2 shows how LTD Broadband calculated the total construction cost for South Dakota to provide service to [redacted] the locations in their RDOF area and have the ability to serve all other locations in their RDOF area within a 10-business day notice.

	LTD Broadband Estimate	Vantage Point Estimate
Total Construction Cost	[redacted]	$91.0M
Cost per Served Location (with [redacted] penetration)	[redacted]	$12,167

Table 2-2. LTD Broadband/Vantage Point Construction Estimate Comparison

Based on these results, one can see that LTD Broadband has grossly underestimated the cost to serve the RDOF locations in South Dakota for which they were the apparent RDOF Phase I Auction winner. Even though their estimate is more than [redacted] ([redacted] too low), the difference would have been greater if my estimate would have included all the costs associated with construction (which are presumably included in LTD Broadband's investment amount). These other costs include:

1. All backhaul facilities needed to transport the traffic from the aggregation points to the Internet Connection Point in Sioux Falls.
2. All core network equipment and routers needed for the network.
3. Any buildings, huts, permits, environmental studies, and rights-of-way (ROW) needed to place the cable, cabinets, and electronics.
4. Any home installation and wiring required

Including these expenses in my estimate would only broaden the gap between the LTD Broadband estimate and the expected actual costs to construct. Based on this, it is obvious that LTD Broadband will

have significantly more capital expense in their network buildout than was accounted for in their business plan. This large additional expense will likely result in LTD's FTTH operation in South Dakota becoming unprofitable, which increases the likelihood of LTD Broadband failing to meet the FCC's buildout requirements and the South Dakota PUC requirements. A failure of LTD Broadband would impact South Dakota consumers since it is possible that the failure would occur after the planned state and federal funding opportunities have past and the citizens covered by the LTD Broadband may be left in a broadband wasteland for many years to come. Providing ETC status to a company that is likely to fail is not be in the public interest. The next section of this report analyzes whether there are enough end user revenues and RDOF support to potentially make up for the underestimate of the construction costs.

3. Business Plan Analysis

To be successful, a broadband provider must not only have a technical solution that will deliver the speed, capacity, and reliability required, but must also be able to do it while remaining a viable business. It doesn't matter how good the technical network is if the company's financial performance cannot sustain the business long-term. No business would start a new venture to lose money and eventually fail. Normally, a business fails because of poor planning – by underestimating the expenses (including debt), overestimating the revenues, or not understanding the marketplace. It is clear from the FCC RDOF Long Form and the discovery provided that LTD Broadband's simplistic approach to business planning resulted in a gross underestimate of the Capital Expenditure (CapEx) required for the RDOF broadband buildout in South Dakota and because of this it will continue to lose money in the South Dakota buildout likely leading to failure.

3.1. LTD Broadband's Determination of CapEx and OpEx

LTD Broadband provided a very simplistic business plan for each of the 15 states where they were the provisional RDOF Phase I Auction winner. Since RDOF requires that all locations in the awarded areas be served within six years, the LTD Broadband business model only addressed years 1 through 6. The FCC defines a location as being "served" if the provider (LTD Broadband in this case) can deliver service to the customer within 10 business days after the customer orders broadband service. Table 3-1 shows

the number of customers that were assumed to be served in each of the 6 years along with the number of customers receiving broadband service from LTD Broadband. It was not clear from the business plan where these customers were located within the eight areas in South Dakota where LTD was the apparent RDOF winner.

Year	Served Locations		Customers
	Percent (%)	Quantity	(mid-year)
1	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

Table 3-1. Customers Served in LTD Business Plan

It does not appear that LTD Broadband used any area-specific surveys, market studies, or engineering to determine the costs to construct to the RDOF locations in South Dakota, but rather used a flawed methodology based on the awarded RDOF support amount. LTD Broadband determined the construction amount by simply multiplying the RDOF support amount awarded in South Dakota by a factor of 1.3. Since LTD Broadband was awarded approximately $46.6M (over 10 years) in the state, the construction amount assumed by LTD Broadband was approximately [redacted]. The approach used by LTD Broadband makes little sense, has no relationship to the true cost to serve each area, and would not result in a realistic estimate for construction costs for several reasons.

As way of background, the "reserve" prices for the RDOF Phase I Auction were determined using the FCC's Connect America Cost Model (CACM). This model develops an estimated cost for a network in the RDOF areas based upon a FTTH architecture and then develops the amount of end-user revenues expected. The CACM then estimates the amount of support needed for a provider to build and operate a FTTH network in this area, since end user revenues are not adequate. The support determined by the CACM includes both capital expenses and operational expenses. The CACM spreads the capital expenses over the expected life of the asset, which for fiber is often 25 to 30 years. For a FTTP network such as

this, generally 60-65% of the expense is operating expense and 35-40% of the expense is associated with capital investments.

If the application of a factor of 1.3 to the RDOF support amount results in a reasonable estimate of the construction costs, it would simply be by coincidence. There is no rational reason why this would provide an accurate estimate for construction costs for the following reasons:

1. The FCC's CACM which is used to calculate RDOF support calculates the support needed for both CapEx and OpEx. LTD Broadband applied the 1.3 factor [redacted] of the support to determine the expected construction costs.
2. The factor of 1.3 was used in all states where LTD Broadband was bidding, regardless of the bidding level or the actual costs to serve in each state. For example, some states the RDOF areas were awarded at the full reserve price (the CACM estimate) and in other areas it was 10% of the reserve price (or less). The cost of construction does not change based on the amount of support that was eventually awarded, yet LTD Broadband's approach would result in a much lower construction estimate in areas where they were awarded a lower percentage of the reserve price.
3. There are many factors such as penetration rates, supply chain shortages, unique construction (rock, trees, water, rough terrain, lack of ROW, other utilities, etc.) and permitting challenges, and middle-mile costs that are not reflected in the CACM support amounts that need to be considered for each area of each state, including South Dakota when determining the cost of construction.

As shown in Section 2.3, Vantage Point estimates that it will take approximately $91.0M to construct FTTH in the areas awarded to LTD Broadband in the RDOF Phase I Auction. This is [redacted] higher than LTD Broadband's estimate of [redacted]. We will see in the next section what impact this error in the construction estimate has on LTD Broadband's business plan.

3.2. Revised Business Plan and Expected Financial Performance

LTD Broadband provided a very simplistic business plan as part of their FCC Long Form application. This Long Form application was provided as part of the discovery in this case. Some of the assumptions used by LTD Broadband in the development of their business plan includes:

1. Construction of the FTTH network will total 1.3 times the amount of RDOF Support received over 10 years (discussed in the previous section)
2. Broadband buildout and penetration rates will be as shown in Table 3-1.
3. Average Revenue per Customer will be [redacted][4] LTD assumed that [redacted] of this would be profit and we assume the other [redacted] will be used to support the Operational Expenses (OpEx).
4. All revenue shortfalls will be covered through [redacted]

One significant omission from the business plan is the cost of money. [redacted]

Vantage Point revised the LTD Broadband business plan to include the cost of money and to extend the plan from 6 years to 10 years. This is shown in Exhibit LT-E2. Even when using the artificially low construction costs calculated by LTD Broadband, they are still expected to experience of loss of almost [redacted] in the first 10 years of operation.

When revising the construction estimate to be more realistic, LTD Broadband's loss will more realistically be [redacted] in the first 10 years as shown in Exhibit LT-E3. It is hard to imagine what LTD Broadband could possibly do to have a sustainable business in South Dakota for their RDOF areas with the support that they will be awarded. All indications are that the level of support received by LTD Broadband in the State of South Dakota is not adequate and the business would likely fail. As mentioned previously, LTD Broadband's failure in South Dakota is not in the public interest since it would likely result in customers that are abandoned and many customers that may never have adequate broadband service

[14] Even though LTD Broadband claimed that they plan to charge their customers $140/month for gigabit service, the proforma that they provided in their FCC Long Form assumed an average customer revenue of [redacted] We assume this is the average for all speeds offered.

since the RDOF award may limit other state and federal funds from being used to build broadband in these areas. Further, LTD would not meet its RDOF buildout of SDPUC ETC obligations.

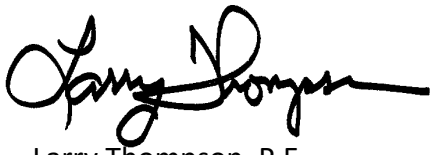
One may wonder if LTD could use the profits from their FTTH network in the other 14 states to offset the losses in South Dakota by averaging across multiple states. However, this is not possible since the same issues I discussed previously with regard to LTD Broadband business plan in South Dakota exists in the other states as well. In fact, LTD Broadband's underestimate of the capital required to build a FTTH network is more significant in other states that have much rockier soil and more environmental issues than South Dakota. The cost per location (when fully built out with [redacted] penetration) that was assumed by LTD Broadband was less than [redacted] more than half of the states where LTD Broadband was the provisional RDOF Phase I Auction winner. To put this in perspective, it costs approximately $2,250 per location, on average, to simply install a fiber drop with the electronics to a typical rural location. This does not include any mainline fiber cable needed to connect these homes to the FTTH network.

Since the RDOF areas are in rural areas that are sparsely populated, each locations portion of the mainline cable can be significant. Because of the rural nature of the RDOF areas, many hundreds of feet or even miles of mainline cable are required to serve each location. In rural areas, it is not uncommon for mainline construction to cost $20K to over $80K per mile. The mainline costs can easily exceed $8K per location and can often be $15K or more. If we were to use a relatively conservative amount of $12K per location as an average cost per location for all LTD Broadband areas and apply this to their proforma, LTD Broadband would not be profitable in any state where they were the provisional RDOF winner and would lose approximately $6B over the next 10 years.

4. Report Summary and Conclusions

Based on my extensive experience constructing FTTH networks in South Dakota and elsewhere, I do not believe it is possible to construct a FTTH network as proposed by LTD Broadband to the locations in their RDOF areas. It is my estimate that these costs would likely be [redacted] higher than the capital expenditure costs assumed by LTD Broadband in their business plan included in their FCC RDOF Long Form. Even when using LTD Broadband's own capital expense estimates, I estimate that LTD Broadband will lose

almost $9M in the first 10 years in South Dakota alone. When using a more realistic capital expense estimate based on our fiber construction experience in South Dakota, we estimate that LTD Broadband will lose almost $50M in South Dakota in the first 10 years. If this is the case, it would be difficult, if not impossible for LTD Broadband to remain a viable broadband provider. If LTD were to fail three years after RDOF award (when the FCC requires performance testing to verify network performance) it will likely be after the currently known state and federal funding opportunities (including the American Jobs Plan and the RDOF Phase II Auction) have passed. These LTD Broadband RDOF Phase I Auction customers will be left in a broadband desert – possibly forever. These citizens will be doomed to always being second-class broadband citizens simply because LTD Broadband was awarded funds as part of an FCC program where they have little or no probability of success. Clearly, awarding ETC status to LTD Broadband is not in the public interest.



Larry Thompson, P.E.
Chief Executive Officer
Vantage Point Solutions, Inc.