

Phase 10

Cost Variables and Forecasts

VRS Feasibility Study

Mission Consulting

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COST VARIABLES AND FORECASTS

EXECUTIVE SUMMARY

1. Overview

This research summary represents the findings of the tenth of twelve phases of a study commissioned by Bell Canada (Bell). The feasibility study was commissioned by Bell as part of a deferral account proposal. The objective of the feasibility study is to provide information to facilitate informed decisions regarding potential regulations and implementation of Canadian video relay service (VRS). Bell engaged Mission Consulting to conduct an independent and comprehensive study of the feasibility of VRS for Canada. The final feasibility report will draw, in part, on information contained in this research summary.

This Phase 10 research summary, *VRS Cost Variables and Forecasts*, provides an analysis of the potential costs of providing VRS in Canada, including but not limited to:

- Estimated VRS annual costs
- Cost basis considerations and their variables
- Factors that may delay full implementation, and related cost forecasts
- Cost estimates for separate ASL and LSQ service providers
- Cost variables
- Factors that may be used to limit or control costs
- Cost risk factors

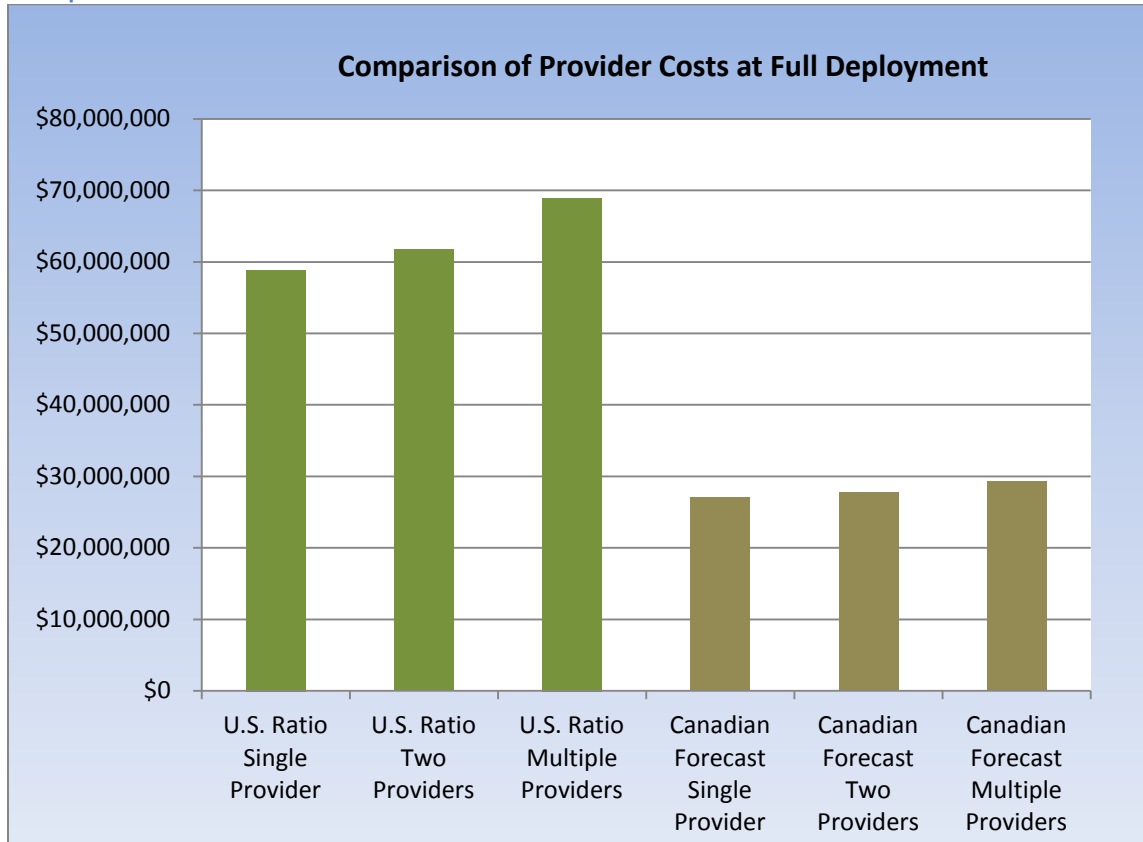
2. Summary Findings

Salient points of this analysis include the following:

Canadian VRS Cost Forecasts

- A fully deployed VRS operating 24/7, subscribed by all forecast users, and provided by multiple vendors will cost approximately \$32 million annually, including administrative costs.
- The forecast of Canadian VRS provider costs are significantly less than U.S. VRS provider costs applied to Canada:

Figure 1: Comparison of U.S. based costs to Canadian Forecasts



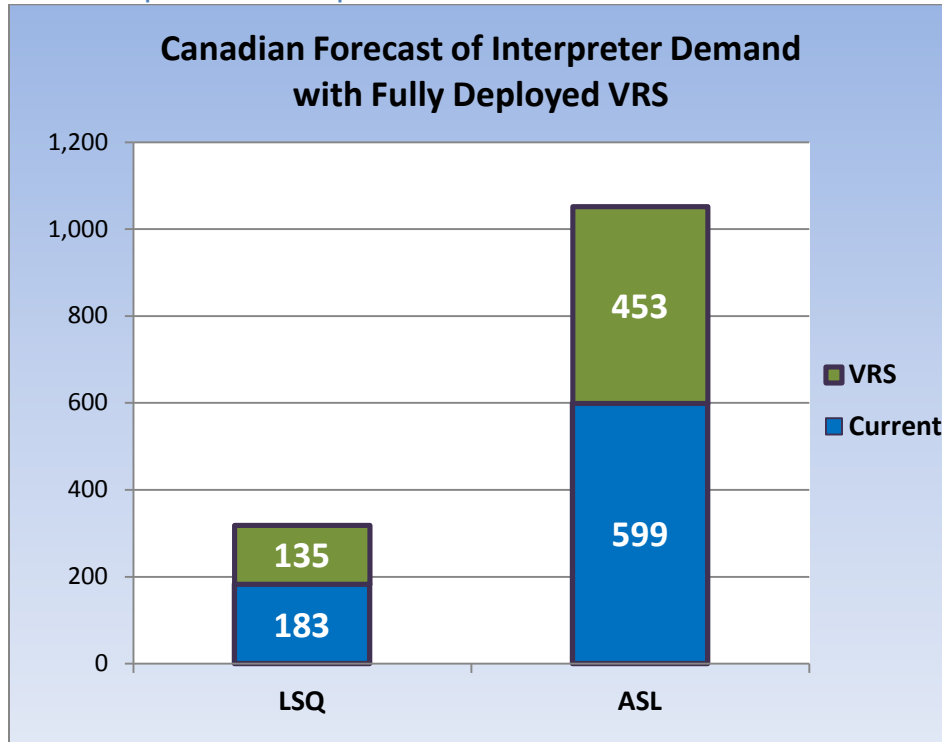
Cost Basis Considerations

- U.S. VRS vendor reimbursement costs are too flawed to be used without a separate Canadian cost analysis. The costs forecast for Canada are based on modified U.S. usage rates and estimated Canadian cost reimbursement rates.
- Canadian VRS costs are based on estimates of the sizes of the ASL and LSQ populations. The ratio of ASL to LSQ users is estimated at 3.3 to 1. Neither the population size nor the ratio has been validated.
- The Canadian Forecast VRS provider reimbursement rates are used in this document to forecast VRS program cost. The actual reimbursement rates for a fully deployed VRS may be based on market conditions (e.g., competitively bid services) and may be higher or lower than the Canadian Forecast rates used herein.

Constraints of Service

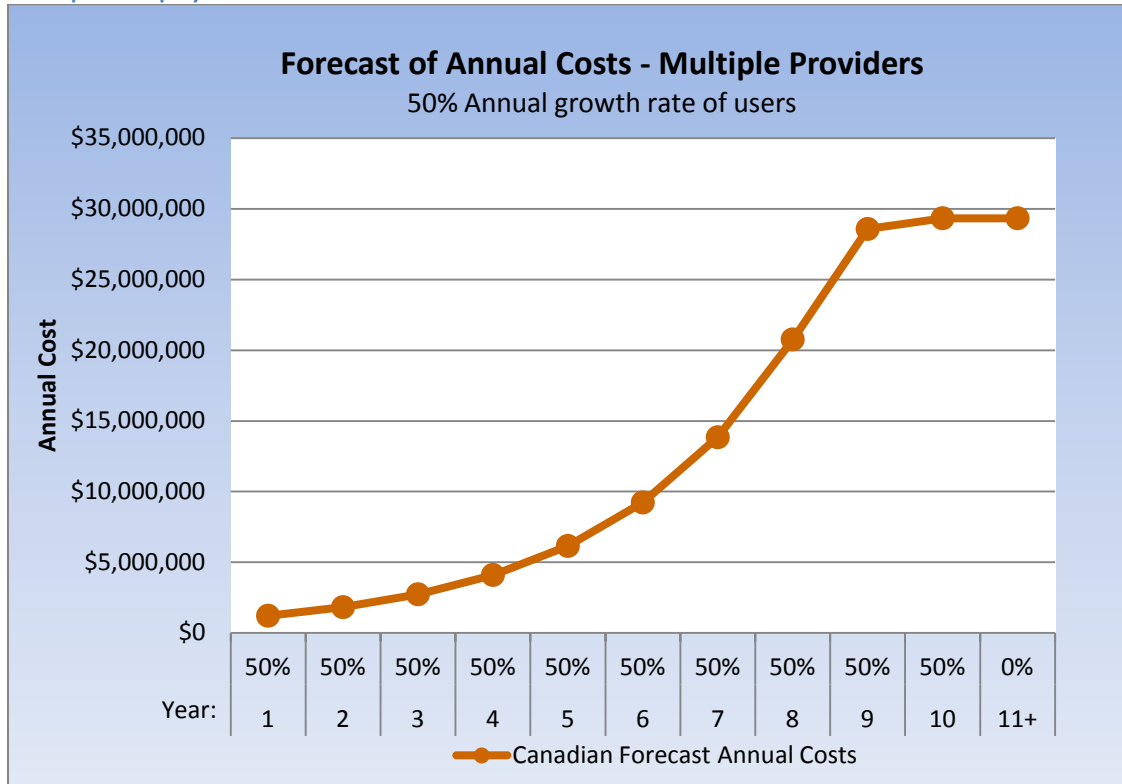
- There are number of potential constraints that may limit the deployment of VRS. The most significant constraint is the lack of Canadian interpreters to work in VRS centers.
- A fully operational VRS will need to employ approximately 75% more interpreters, part-time, than are currently present in Canada:

Figure 2: Demand for part-time VRS interpreters at full service



- One third of the current ASL Canadian interpreters are working at U.S. owned VRS centers in Canada, servicing U.S. consumers. All other current ASL and LSQ interpreters are providing community interpreting to Canadian sign language users.
- The lack of available interpreters for VRS will cause VRS deployment to occur over time while additional interpreters are trained. An aggressive expansion of existing interpreter training programs will be required in order to fully deploy VRS over ten years, as depicted below:

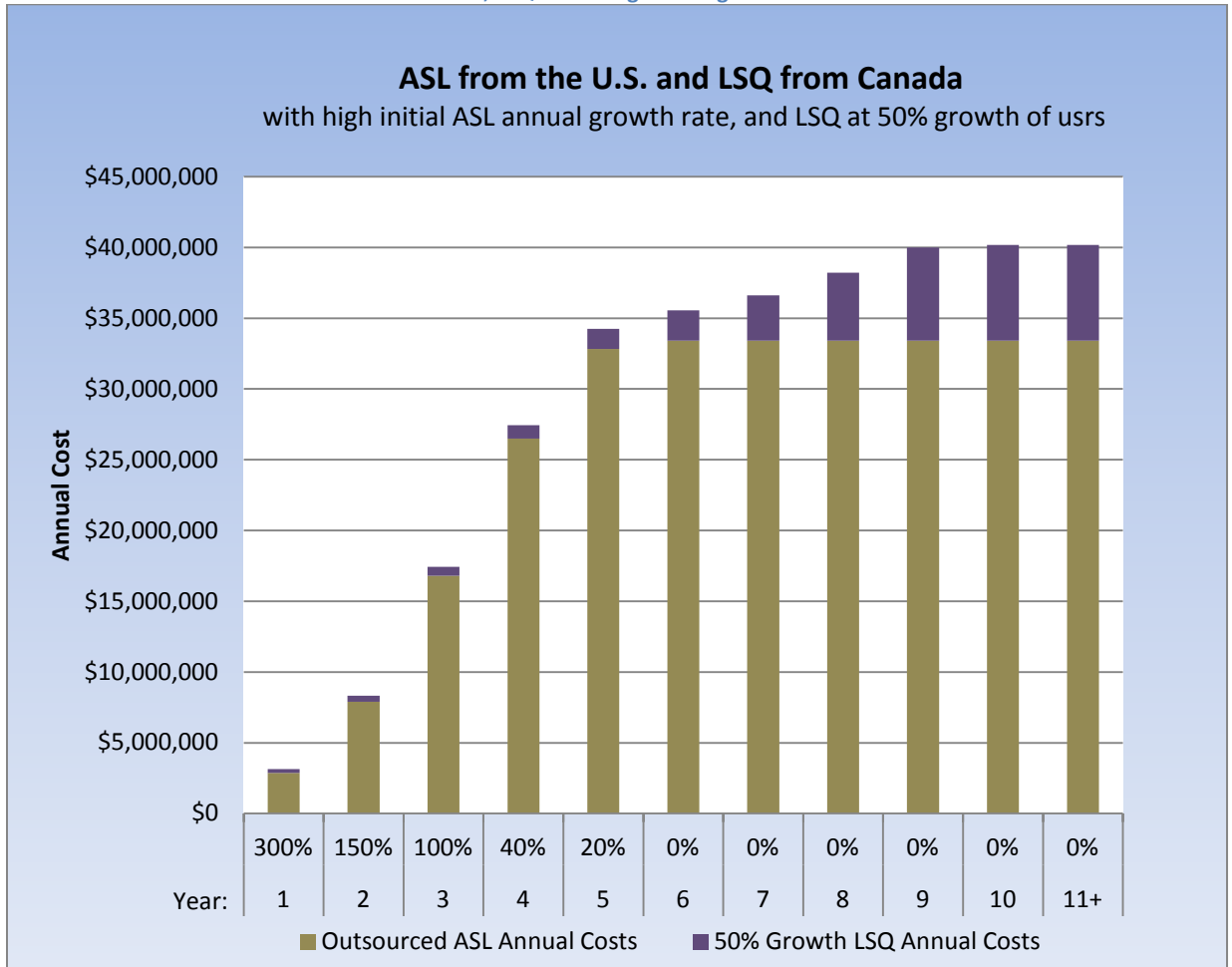
Figure 3: Anticipated deployment of VRS over time



- Canada’s college and university interpreter training programs generally report that they do not have the resources to readily expand their training beyond the levels required to maintain the current labour pool.¹
- By separately contracting for ASL VRS and LSQ VRS, ASL VRS could be outsourced to ASL VRS providers located in the United States, where sufficient ASL interpreters exist.
- Canadian LSQ VRS cannot be outsourced as LSQ interpreters are generally not available outside of Quebec.
- An outsourced ASL VRS would be expected to have a higher adoption rate by Canadian ASL users since the availability of the service would not be constrained by a lack of interpreters (note that the costs in the following chart do not include administrative costs):

¹ See this VRS Feasibility Study’s phase 6, *Interpreter Considerations*, for details.

Figure 4: ASL outsourced to the United States at U.S. rates; LSQ remaining at 50% growth



- Outsourcing ASL to the United States would result in significantly higher initial and ongoing VRS program costs as U.S. providers operate at higher reimbursement rates than are forecast for Canadian based VRS. Fully deployed outsourced ASL VRS paired with Canadian served LSQ VRS is expected to cost approximately \$42.5 million annually, including administrative costs.

Available Limitations or Controls on Costs

- Cost controls must primarily limit consumer availability to VRS, limit the consumers’ minutes of use, or reduce demand for the service.
- Restricting VRS hours of operation may decrease demand and associated costs. Limiting VRS availability to 8:00 AM to 8:00 PM, Monday through Friday, may decrease program costs by approximately 17 percent.
- Another potential restriction can be limiting the number of minutes allowed per consumer. This type of restriction will likely face greater consumer opposition.
- Consumer demand for the service (thereby affecting minutes of use and cost) can be lessened by requiring consumers to pay for a portion of the VRS service (e.g., cost per minute or cost per call), the consumers’ VRS equipment, or the consumers’ broadband service.

Other Cost Considerations

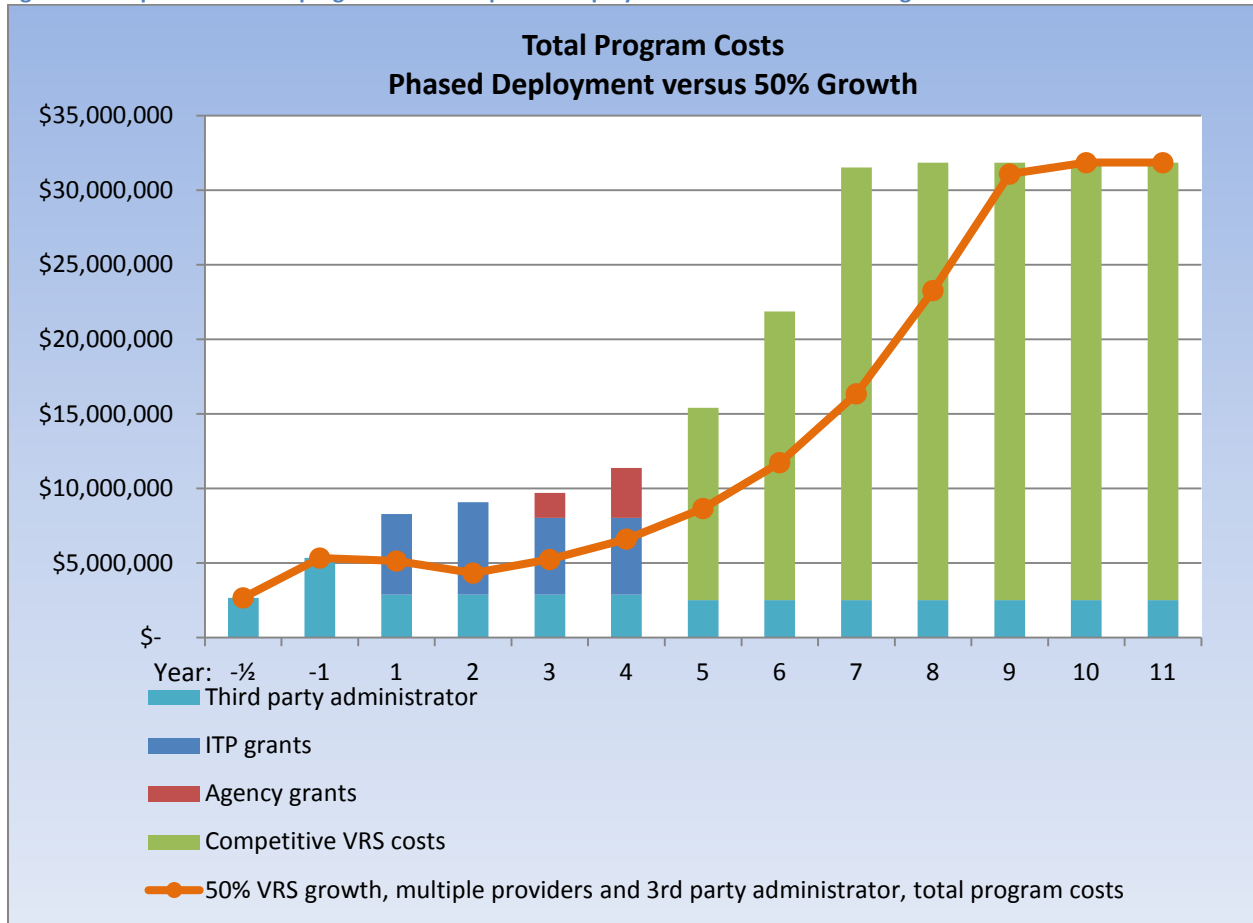
- If VRS is deployed with clear guidelines and regulations to limit fraudulent use of the service, and if VRS is competitively bid or is otherwise kept at reasonably low provider reimbursement rates, Canada should not experience the fraudulent use and billing practices experienced in the United States.
- If U.S. VRS rates remain high, they will create market pressure within Canada to have Canadian VRS reimbursement rates somewhat on par with the U.S. rates so that Canadian VRS can compete for available interpreters. Likewise, local future Canadian VRS providers may put emphasis on providing ASL VRS on behalf of U.S. consumers if the U.S. reimbursement rates remain high.²
- Video Remote Interpreting (VRI) is not expected to be included as a reimbursable function of VRS, since it is generally not considered a form of telecommunications or message relay service, and is therefore considered to be outside the jurisdiction of the CRTC. However if VRI were included and funded by the VRS fund, its potential cost impact may be high. If necessary, the potential cost of VRI and its effect upon community interpreting may best be measured in a VRI trial.
- Consumer use of TTY MRS will continue to decline as VRS is adopted, but not significantly as a result of VRS adoption.
- Potential third party administrative costs, public education and outreach costs, and consumer equipment and broadband costs are considered.
- The selection of different model choices from phase 11, Potential Canadian VRS Models, and their application in phase 12, Final Report, can result in changes to the cost forecasts.³

² The FCC has indicated that it intends to significantly reduce VRS reimbursement costs, and these issues may become moot by the time Canada establishes its actual VRS rates and begins offering VRS.

³ See this phase's section 5.6, *VRS Model Cost Considerations*.

For example the recommended two-phased deployment model results in increased interpreter availability for VRS, initially more minutes of relayed conversation, and therefore also higher initial costs. A comparison of these costs to the 50% annual growth cost model is depicted in the following graph:

Figure 5: Comparison of total program costs of a phased deployment versus a 50% annual growth model



- A concise summary of cost risks, assumptions, impacts and outcomes is also presented.

3. Conclusion

Many of the variables that will influence the final cost to implement VRS in Canada remain undecided or uncertain at this time. These include dependence on other factors such as the availability of interpreters and the cost of labor when the service is deployed. A few variables may be used to potentially control or limit total costs. Cost limits are generally accomplished by limiting consumer use of the service or by financially limiting the providers' ability to offer the service. Limits on consumer use experienced in other countries (but not the U.S.) are restricting user access via time of day, by minutes of use, and/or by requiring consumers to pay for all or part of the service. Financially limiting providers' ability to offer the service without effective controls on consumer demand can lead to significant quality of service issues.

While U.S. VRS data can be informative for forecasting Canadian VRS usage and costs, there are significant discrepancies within the U.S. data that make its application to Canada problematic. Additionally the Canadian environment (numbers of available interpreters, etc) is significantly different from the U.S. to warrant significant modification of any application of U.S. data to Canada. In fact, suggested Canadian VRS provider reimbursement rates are best derived from new analysis of Canadian cost factors.

In the past estimates have been offered to the CRTC that VRS in Canada may cost between \$50 to 100 million CAD. Using the forecasting methods in this analysis, the cost of a full 24/7 deployment of VRS is significantly less as shown in the table below. Also estimated are the costs of a 12-hour 5-day schedule for VRS.

Table 1: Annual VRS provider and administrative forecast costs, at full subscription

Forecast ongoing VRS annual program costs	24 x 7 VRS	Restricted Hours VRS
Annual provider costs:	\$29,329,666	\$24,343,624
Annual administrative costs:	\$2,510,000	\$2,510,000
Total costs:	\$31,839,666	\$26,853,624

These are forecast costs. Actual costs are expected to represent market conditions, and may be higher or lower than the cost forecasts.

During an anticipated multi-year implementation, the maximum forecasted usage and cost may not be reached until the tenth or eleventh year, depending upon the consumers’ rate of VRS adoption and/or depending upon possible usage restraints to mitigate costs. These costs do not include potential consumers’ costs or the potential costs of education and outreach.

COST VARIABLES AND FORECASTS

RESEARCH SUMMARY

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The twelve phases of the study are as follows:

- Phase 1 Project Confirmation
- Phase 2 Legal Background for Canadian VRS
- Phase 3 Consumer Interests and Perspectives
- Phase 4 VRS Models in Other Countries
- Phase 5 Technologies and their Forecasts
- Phase 6 Interpreter Considerations
- Phase 7 Quality of Service
- Phase 8 Potential Related Services
- Phase 9 Forecasts of VRS User Demand
- Phase 10 VRS Cost Variables and Forecasts
- Phase 11 Potential Canadian VRS Models
- Phase 12 VRS Feasibility Study Report

This Phase 10 research summary, *VRS Cost Variables and Forecasts*, provides an analysis of the potential costs of providing VRS in Canada, including but not limited to:

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- Cost variables
- Factors that may be used to limit or control costs
- Cost risk factors

2. Background

This phase 10 research summary will provide an overall annual cost estimate of a fully operational (24 x 7, ASL and LSQ), fully subscribed Video Relay Service in Canada. The overall cost estimate will, for reasons discussed herein, be informed by VRS cost and usage data from the United States but modified significantly for the Canadian environment. Therefore a presentation of U.S. cost methodology, usage and cost components precedes the Canadian forecasts. The Canadian forecasts are followed by a presentation of variables that can affect the total annual cost. Some of these variables can be modified by policy, while others may be difficult to influence or even to estimate. Examples of the effect of some variables will be illustrated in forecasts which may be useful in guiding policy decisions to the extent that services may be constrained by available funds or by other factors such availability of interpreters. The actual final annual cost will be a combination of many factors that may often influence each other. Therefore predicting a final program cost with accuracy is problematic, since many key data elements are unknown or difficult to gauge with certainty including actual market rates, and since many are dependent upon policy decisions that have yet to be made.

Some broad forecasts of Canadian VRS costs have been reported at the hearing leading to CRTC Decision 2009-430, in which a provider estimated \$50 to \$100 million annually for a full service VRS,⁴ and another estimate was in the order of \$66 million annually.⁵ All forecasts derived from the best data available for this study project an eventual annual cost of approximately \$32 million for a fully deployed service. This \$32 million could be subject to further adjustments that, depending upon the VRS model chosen, could very reasonably reduce the total forecast to be about \$27 million. Additional potential cost or usage policy restrictions may also be applied to reduce these estimates if necessary to meet available funding limitations.

Not all of the identified cost elements may end up being components of the selected Canadian VRS model. Some costs attributed to one category may be eventually represented in another category, when the specific service model and related regulations are adopted.

These cost forecasts frequently refer to information and data presented in the research summaries of earlier phases of this VRS feasibility study project. All costs depicted in this report are in Canadian dollars except where specifically stated as U.S. dollars (USD).⁶

⁴ GoAmerica/Purple communications; “Response to the CRTC’s Request for Further Information Following GoAmerica’s November 21, 2008 Presentation at CRTC Public Hearing”; Telecom Public Notice CRTC 2008-8; December 23, 2008.

⁵ Bell Canada; “Information requested by Canadian Radio-television and Telecommunications Commission (CRTC)”; Response to Undertaking; The Companies (CRTC)26Nov08-11 PN 2008-8; Transcript Ref: Vol. 6, Paragraphs 11011 - 11021

⁶ Present U.S. dollars throughout this document are converted to Canadian dollars at the exchange rate of 1.0208 to the Canadian dollar, as reported by the Bank of Canada at the close of 11/15/2011, at <http://www.bankofcanada.ca/rates/exchange/us-can-summary/>.

2.1. General VRS Cost Forecasting Methodology

This phase of the study assesses potential VRS program costs, based on estimates for the number of potential Canadian VRS users, their initial and long-term traffic estimates, provider charges, and other program related expenses.⁷

The United States is presently the only country where fairly unrestricted use of VRS is available on a 24-hour a day, seven days a week basis. With a significant volume of related VRS data, traffic patterns, and costs, the U.S. VRS environment provides a significant source of information useful for forecasting potential VRS usage and costs of VRS in Canada. Being informed by the U.S. data is also supported by the Canadian Association for the Deaf:

“CAD submits that it is never going to be able to arrive at a precise estimate [of VRS usage] because the information necessary just does not exist and never will. There is, for example, no accepted data as to how many sign language users there are in Canada and no accepted means to collect such data. There is years of experience in the USA that can be looked at. There is no reason that the Canadian experience will vary greatly from that in the USA once the catching up process has been completed.”⁸

3. Cost Forecasts of a Mature Canadian VRS Program

In this study’s phase 9, *Forecasts of VRS User Demand*, two scenarios were presented for a fully mature Canadian VRS program. Both depicted the total number of VRS users, their average annual minutes of use, and the total number of annual minutes. However, the first scenario applied the current U.S. VRS usage rates to Canadian demographics, resulting in Canadian usage projections that were referred to as “U.S. Ratio” forecasts. The second scenario applied significant adjustments to the U.S. data, modifying it to the characteristics of the Canadian environment as distinct from the U.S. VRS environment. This second scenario was referred to as the “Canadian Forecast” and was considered to represent the most probable forecast for Canada for a fully deployed 24 x 7 VRS at an eventual maximum usage rate.⁹ The “U.S. Ratio” numbers were shown for comparative purposes only.

This cost analysis continues to use this dual approach. The projected costs of a Canadian VRS will be presented in section 3.1 based on the U.S. Ratio forecast usage for Canada, at current U.S. FCC VRS reimbursement rates. These costs will continue to be termed “U.S. Ratio” costs. After these costs are portrayed an analysis of the U.S. reimbursement formulas will be presented in section 3.2 resulting in

⁷ See this study’s phase 9, *Forecasts of VRS User Demand*.

⁸ Canadian Association of the Deaf; CAD; CRTC Public Hearing Telecom Public Notice CRTC 2008-8; Unresolved Issues Related to the Accessibility of Telecommunications and Broadcasting Services to Persons with Disabilities; October 6, 2008

⁹ See section 3.3, *Canadian VRS Forecast Using Adjusted U.S. Data*, of phase 9, *Forecasts of VRS User Demand*.

potential adjustments to the rates as applicable to Canada. These potential adjusted rates are then contrasted to Canadian cost estimates resulting in a new Canadian Forecast for VRS provider reimbursement rates. The Canadian Forecast rates are then applied to the Canadian Forecast of usage from phase 9, to generate a “Canadian Forecast” of VRS provider costs. Again, the Canadian Forecast is offered as the probable Canadian VRS cost paid to a VRS provider serving Canada for VRS at full maturity. The U.S. Ratio costs are presented only for comparison.

3.1. U.S. Ratio Costs

3.1.1. VRS provider rates in the United States

As this analysis considers the United States VRS program costs for the introduction of VRS into Canada, it is useful to understand the methodology of how the VRS vendor rates in the U.S. have been established. Historically, the Interstate Telecommunications Relay Services (TRS) Fund Administrator submits proposed compensation rates, demand projections, projected fund size and proposed carrier contribution factors in accordance with FCC regulations. These would then be reviewed and subsequently approved or modified by the FCC.

As will be presented below, the reimbursement rates approved by the FCC to VRS providers are historically based on provider generated forecasts of their costs. As the VRS services are not competitively bid, there is no basis for an accurate and market correct estimate of what providers might propose as a competitive rate, if they were required to follow a different procurement model. Also, currently U.S. providers are fairly secure that their government VRS reimbursements will continue, year after year, for the foreseeable future. However, since the rates approved by the FCC may directly affect the Canadian VRS market, including competitively bid services, the FCC policies are provided with the understanding that the FCC is presently reexamining the VRS rate structure and may significantly revise it before or soon after this VRS feasibility study project is concluded.

The FCC’s *Cost Recovery Order* is the regulatory declaration that provides the rules and guidelines to submit proposed compensation rates for relay services. Currently, the relay services are separated into three different groups and three different rate methodologies.

1. Interstate traditional TTY TRS/MRS, interstate Speech-to-Speech (STS), interstate captioned telephone service and interstate and intrastate Internet Protocol captioned telephone service (IP CTS) compensation rates are all calculated using the Multi-state Average Rate Structure (MARS) Plan. This methodology uses a weighted average of competitively bid state rates for determining the national rate.
2. According to the *Cost Recovery Order*, IP Relay call compensation rates are based on price caps for a three year period. *“The price cap methodology applies three factors to a base rate – an Inflation Factor, an Efficiency (or “X”) Factor, and Exogenous Costs. The basic formula takes a*

base rate and multiplies it by a factor that reflects an increase due to inflation, offset by a decrease due to efficiencies.”¹⁰

3. The FCC *TRS Rate Methodology Order* also established a separate methodology for calculating VRS compensation rates. According to the regulation, the VRS providers would submit to the Administrator their own projected costs and anticipated minutes of future use, along with actual cost and demand data for the previous year. The TRS Fund Administrator would then use this information to propose the next reporting period’s compensation rates. This methodology created an inconsistent pricing structure that fluctuated from a low of \$7.84 (\$5.14 USD) per VRS minute the first year to a high of \$25.58 (\$17.04 USD) per VRS minute in 2002/2003, and currently back down to an average of \$5.97 (\$5.85 USD) per VRS minute.¹¹

Table 2 below, shows the history of U.S. VRS reimbursement rates (in USD per conversation minute) and the VRS fund values (in millions of USD).¹²

¹⁰ Federal Communications Commission (FCC); Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size estimate; CC Docket 03-123; May 2009. Available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-09-39A1.doc.

¹¹ National Exchange Carriers Association (NECA); 2010-2011 TRS Filing at <http://fjallfoss.fcc.gov/ecfs/document/view?id=6520215580>; Relay Services’ Reimbursement Rate, Contribution Factor & Fund Size History revised 07/06/10.xls; 7/13/2010. Conversion from USD to CAD at a 1.5263 exchange rate at 11/1/2000 at <http://www.x-rates.com/cgi-bin/hlookup.cgia>, and an average 1.5101 exchange for the 2002/2003 date range at <http://www.bankofcanada.ca/rates/exchange/10-year-converter/>. Neither the USD or the CAD of these two historical rates have been adjusted to present value.

¹² Although the FCC reimburses VRS providers based on conversation minutes, there is a discrepancy in how a “conversation minute” is defined in regulation versus how it is billed. Generally providers bill “conversation minutes” when both the calling and called parties are connected through the relay provider’s video interpreter.

Table 2: U.S. historic VRS rates and fund size in USD

		VRS Tier 1	VRS Tier 2	VRS Tier 3		FUND	SIZE		CONTRIBUTION
DATE	VRS***	0-50,000 min	50,001-500,000	>500,000		MIN (M)	MAX (M)	CUM. (M)	BASE (B)**
1993	N/A	N/A	N/A	N/A		\$25.50	\$30.80	\$30.80	
1994	N/A	N/A	N/A	N/A		REQT	NET		
1995	N/A	N/A	N/A	N/A		\$24.80	\$14.70	\$45.50	
1996	N/A	N/A	N/A	N/A		\$29.40	\$28.50	\$74.00	\$86.40
1997	N/A	N/A	N/A	N/A		\$44.20	\$53.20	\$127.20	\$92.20
1998	N/A	N/A	N/A	N/A		\$48.70	\$40.20	\$167.40	\$103.50
1999	N/A	N/A	N/A	N/A		\$43.00	\$38.00	\$205.40	\$100.00
1/00-6/00	N/A	N/A	N/A	N/A					
7/00-12/00	N/A	N/A	N/A	N/A		\$62.00	\$58.60	\$264.00	\$80.50
10/00-12/00	\$5.14	N/A	N/A	N/A					
1/01-6/01	\$5.54	N/A	N/A	N/A					
3/01-6/01	\$5.54	N/A	N/A	N/A					
7/1	\$7.45	N/A	N/A	N/A		\$70.00	\$59.00	\$323.00	\$81.30
8/01-6/02	\$9.61	N/A	N/A	N/A					
4/22/02-6/02	\$9.61	N/A	N/A	N/A					
7/02-6/03	\$17.04	N/A	N/A	N/A		\$90.00	\$64.00	\$387.00	\$79.90
7/03-6/04	\$7.75	N/A	N/A	N/A		\$115.50	\$115.50	\$502.50	\$77.50
7/03-6/04 (2/04)	\$7.75	N/A	N/A	N/A		\$170.50	\$170.50	\$557.50	\$77.50
7/03-6/04 (7/06)	\$8.85	N/A	N/A	N/A					
9/03-6/04 (6/04)	\$8.85	N/A	N/A	N/A		\$170.50	\$170.50	\$557.50	\$77.50
7/04-6/05	\$7.29	N/A	N/A	N/A		\$289.40	\$289.40	\$846.90	\$81.20
7/04-6/05 (12/04)	\$7.60	N/A	N/A	N/A		\$289.40	\$289.40	\$846.90	\$81.20
7/05-6/06	\$6.64	N/A	N/A	N/A		\$441.50	\$441.50	\$1,288.40	\$78.20
07/06-06/07	\$6.64	N/A	N/A	N/A		\$419.70	\$419.70	\$1,708.10	\$78.50
07/07-06/08	\$6.64	N/A	N/A	N/A		\$553.40	\$553.40	\$2,261.50	\$76.80
***07/07-06/08	N/A	\$6.77	\$6.50	\$6.30		\$636.70	\$636.70	\$2,898.20	\$77.70
07/08-06/09	N/A	\$6.74	\$6.47	\$6.27		\$805.50	\$805.50	\$3,703.70	\$79.60
07/09-06/10	N/A	\$6.70	\$6.44	\$6.24		\$891.00	\$891.00	\$4,594.70	\$78.30
07/10-06/11		\$6.24	\$6.23	\$5.07		\$433.90	\$433.90	\$5,028.60	\$74.10

The FCC 2007 *Cost Recovery Order* adopted a tiered rate methodology for VRS based on call volume. The tiered rate approach allows smaller VRS providers, those that have fewer monthly VRS minutes billed to the fund, to be compensated at an average rate that is higher than the average rate for high volume providers. It is believed that the higher rate encourages new service providers to enter the VRS market. In addition, the FCC set base compensation rates for three tiers to be in effect for a three year period and reduced annually by 0.5 percent to reflect productivity gains.¹³

The Cost Recovery Order required VRS providers to continue to submit actual and projected cost and demand data to the Fund Administrator. The actual historical costs were requested to be categorized into five expense categories so that the information would be useful in reviewing the reasonableness of rates adopted for each tier from the different VRS providers. The Administrator would then present the actual weighted average costs for all providers as it recommended the next tiered rate schedule.

¹³ Federal Communications Commission (FCC); Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities, CG Docket No. 03-123, Cost Recovery Order at ¶ 47.

The following chart provides a five year view of the VRS weighted cost composition projections as provided by vendors in U.S dollars:

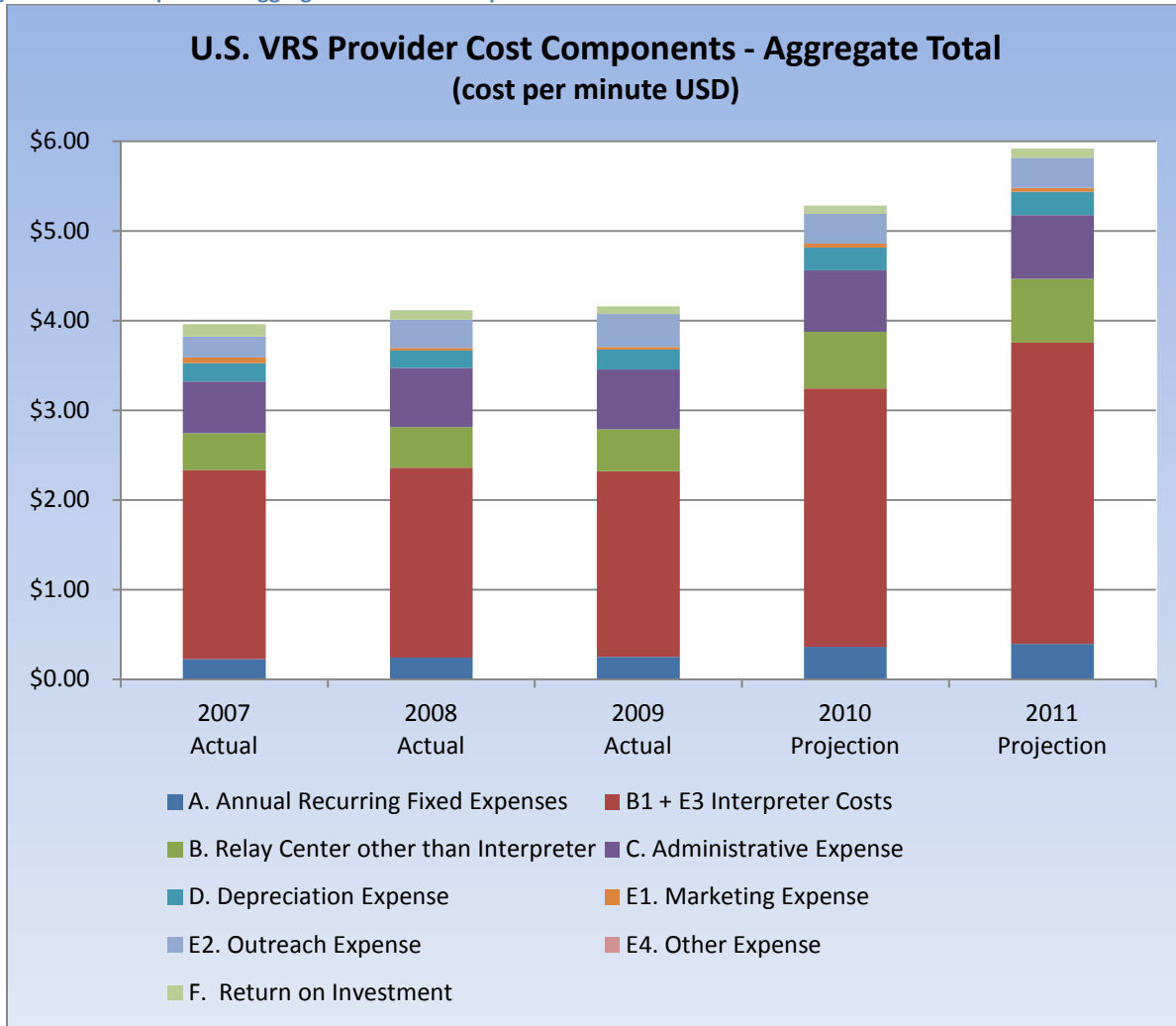
Table 3: US VRS Provider Cost Components (USD) ¹⁴

Cost Category	2007 Actual	2008 Actual	2009 Actual	2010 Projection	2011 Projection
Annual Recurring Fixed Expenses	\$0.2260	\$0.2427	\$0.2487	\$0.3649	\$0.3936
Interpreter Costs	\$2.1070	\$2.1175	\$2.0742	\$2.8782	\$3.3625
Relay Center other than Interpreter	\$0.4118	\$0.4514	\$0.4649	\$0.6334	\$0.7110
Administrative Expense	\$0.5774	\$0.6601	\$0.6688	\$0.6866	\$0.7113
Depreciation Expense	\$0.2054	\$0.1971	\$0.2210	\$0.2531	\$0.2582
Marketing Expense	\$0.0639	\$0.0283	\$0.0302	\$0.0415	\$0.0426
Outreach Expense	\$0.2321	\$0.3122	\$0.3662	\$0.3317	\$0.3383
Other Expense	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000
Return on Investment	\$0.1369	\$0.1087	\$0.0855	\$0.0932	\$0.1004
TOTAL COST PER MINUTE (USD)	\$3.9605	\$4.1180	\$4.1595	\$5.2826	\$5.9179

Because of the relatively high cost of interpreter labor and the limited number of interpreters available for VRS employment, cost efficiencies realized in most service businesses may not apply to VRS. As the volume of VRS traffic overall increases, there is expected to be a greater competition between providers for interpreters, thereby driving the cost of labor higher. Figure 6 below provides visual representation of the U.S. VRS cost composition. The costs depicted for 2010 and 2011 are shown to increase because those years' costs are based on provider forecasts, not on actual costs; and based on historical provider forecasts are highly suspect.

¹⁴ Federal Communications Commission (FCC); Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate; Interstate Telecommunications Relay Services (TRS) Fund For July 2010 through June 2011; CC Docket 03-123; CG Docket No. 10-51; April 30, 2010.

Figure 6: U.S. VRS provider aggregate total cost component



The cost categories in the above chart include all of the providers' costs for delivery of the service including: land and buildings expense, interpreter expense (including subcontractor expense), non-interpreter relay center expense, indirect expense, depreciation expense, marketing expense, outreach expense, other expense, and a return on capital investment (at 11.25%).¹⁵

In addition, the TRS Fund Administrator also includes additional cost components in the proposed rate recovery mechanisms. The Administrator proposes additional compensation of \$0.0083 USD per minute for 10 digit numbering and E9-1-1 reimbursement. The Administrator also added a 1.6 percent Cash

¹⁵ National Exchange Carrier Association's (NECA) annual submission to the Federal Communications Commission (FCC) of the Interstate Telecommunications Relay Services (TRS) Fund Payment Formula and Fund Size Estimate for July 2010 through June 2011; CC Docket 03-123; CG Docket No. 10-51; April 30, 2010, at <http://fjallfoss.fcc.gov/ecfs/document/view?id=7020443086>. NECA's annual TRS submittal for July 2011 through June 2012 did not contain any analysis of VRS rate costs or rate cost projections: page 14 at <http://fjallfoss.fcc.gov/ecfs/document/view?id=7021341474>.

Working Capital Adjustment to the providers’ cost structure prior to determining a reimbursement per minute rate for the VRS Fund.

After reviewing the NECA submittal and receiving industry and consumer complaints that lower rates would jeopardize quality of service or provider viability, the FCC declined to change the VRS reimbursement rates, stating:

“However, in light of concerns expressed by the providers and users, and to ensure sufficient, quality service for users while the Commission considers broad reform, we decline to reduce the VRS rates to that level at this time.”¹⁶

Therefore the current U.S. reimbursement rates for the three tiers of annual minutes of use for VRS are:¹⁷

Table 4: VRS tiered rate structure and rates, U.S.

Tier	Minutes of Use	Rate per Minute
Tier I	< 50,000	\$6.3688 (\$6.2390 USD)
Tier II	50,001 – 500,000	\$6.3632 (\$6.2335 USD)
Tier III	> 500,000	\$5.1722 (\$5.0668 USD)

The establishment of three rate tiers may by itself give the impression that VRS traffic is equally distributed between the tiers. For example, although the threshold of Tier 1 minutes is comparatively low (50,000 minutes) there are far more VRS providers that operate only within that tier, as compared to the number of VRS providers that reach Tier 3. However, the actual distribution of total annual U.S. VRS minutes by tier is highly skewed. The following table and chart depict the distribution by tier of the U.S. annual VRS minutes reported for July 2009 to through June 2010:

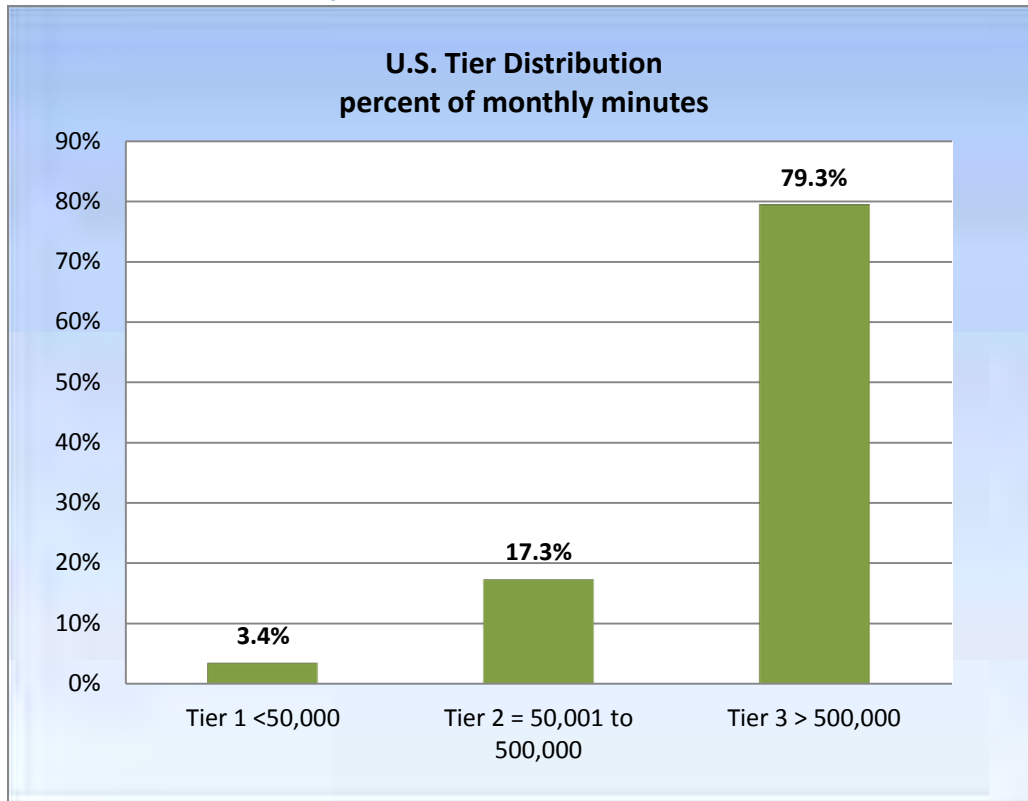
¹⁶ Ibid; page 5

¹⁷ The FCC is intending to again address VRS reimbursement rates in late 2011 or early 2012 in an effort to reduce rates to be more in line with what the FCC may estimate as reasonable and actual costs. Thus the U.S. VRS rates may change from those shown in Table 4.

Table 5: Distribution of U.S. VRS minutes by provider

Provider	Percent of Minutes	Monthly Minutes	Tier 1 <50,000 minutes	Tier 2 50,001 to 500,000	Tier 3 > 500,000 minutes
Number 1	83.7000%	6,893,841	50,000	449,999	6,393,841
Number 2	7.7400%	637,495	50,000	449,999	137,495
Number 3	5.9600%	490,888	50,000	440,888	
Number 4	1.6000%	131,782	50,000	81,782	
Number 5	0.5100%	42,005	42,005		
Number 6	0.2100%	17,296	17,296		
Number 7	0.0900%	7,413	7,413		
Number 8	0.0400%	3,295	3,295		
Number 9	0.0300%	2,471	2,471		
Number 10	0.0200%	1,647	1,647		
Number 11	0.0100%	824	824		
Number 12	0.0100%	824	824		
Number 13	0.0100%	824	824		
Number 14	0.0100%	824	824		
Number 15	0.0090%	741	741		
Number 16	0.0080%	659	659		
Number 17	0.0075%	618	618		
Number 18	0.0060%	494	494		
Number 19	0.0050%	412	412		
Number 20	0.0050%	412	412		
Number 21	0.0040%	329	329		
Number 22	0.0030%	247	247		
Number 23	0.0030%	247	247		
Number 24	0.0025%	206	206		
Number 25	0.0025%	206	206		
Number 26	0.0025%	206	206		
Number 27	0.0020%	165	165		
Total Monthly Minutes:		8,236,369	282,364	1,422,667	6,531,336
Total Annual Minutes:		98,836,426	3,388,365	17,072,010	78,376,027

Figure 7: Distribution of U.S. VRS minutes by tier



U.S. VRS rates per tier are set by averaging the self-reported cost of the providers. For example Tier 1 rates are comprised only of costs of providers that relay less than 50,000 conversation minutes per month. In actuality all of these minutes used for Tier 1 rate setting are relayed by companies (provider numbers 5 through 27 in the above table) that are subcontracted to prime VRS contractors. In the Tier 1 rate calculation the costs of the subcontractor are accounted as “interpreter costs” even though they may include the subcontractor’s overhead and other costs as well as profit. Tier 2 rates are composed of all VRS providers except Sorenson. Tier 3 is comprised only of costs for VRS conversation minutes that are relayed by companies that exceed 500,000 minutes per month, which are only Sorenson and Purple. The dominance of the market by one provider, Sorenson at 83.7%, (or the top three providers at 97.4% of the market) is striking.¹⁸ Because these companies handle almost all of the minutes it is their self-reported cost data that effectively determines the program costs of VRS in the U.S., regardless of the Tier 1 rates offered to smaller providers. U.S. VRS companies are paid for minutes by tier, so that a company’s first 50,000 minutes per month are paid at the Tier 1 rate, its next 450,000 minutes are paid at the Tier 2 rate, and all additional minutes are paid at the Tier 3 rate even though a Tier 3 provider like Sorenson has apparently claimed that the cost of its minutes are mostly equivalent to the Tier 3 cost per minute.

¹⁸ The third ranked provider is generally considered to be either CSDVRS (Z) or Sprint. The fifth ranked provider has identified itself as Convo.

3.1.2. Canadian VRS provider costs using U.S. Ratios

To apply the U.S. cost model to Canada, the current published FCC rates are applied to an estimate of Canadian VRS traffic volumes for a fully deployed VRS operating 24 hours a day 365 days of the year serving all anticipated Canadian VRS users without restrictions.

Forecasts provided in the phase 9 report stated the numbers of estimated users and annual minutes using current U.S. Ratios as follows:

Table 6: U.S. Ratio – forecasts for Canada at VRS usage saturation¹⁹

Canada Forecasts at VRS Usage Saturation using U.S. Ratios	
Forecast ASL & LSQ VRS users (at 0.050% of population)	17,050
Forecast number of ASL VRS users (at 77% of users)	13,128
Forecast number of LSQ VRS users (at 23% of users)	3,922
Estimated average annual VRS minutes per user	635
Forecast of Canadian VRS annual minutes	10,826,750

To apply the U.S. VRS three tier methodology, an adjustment in tier level thresholds was applied to tiers II and III to accommodate the comparatively lower overall forecast of Canadian traffic, and potentially a fewer number of providers serving the Canadian consumers.

Table 7: Suggested VRS tiered minutes for Canada compared to U.S. tiers

US Traffic Rate Monthly Thresholds	Suggested Canadian Monthly Thresholds
Tier I = < 50,000 minutes	Tier I = < 50,000 minutes
Tier II = 50,001 to 500,000 minutes	Tier II = 100,001 to 200,000 minutes
Tier III = > 500,000 minutes	Tier III = > 200,000 minutes

A combined view of the suggested Canadian thresholds and Canadian equivalent rates is shown below.

Table 8: U.S. Ratio – VRS tiered rate structure and per minute reimbursement rates

Tier	Monthly Minutes of Use	Rate (CAD)
Tier I	< 50,000	\$6.3688
Tier II	100,001 – 200,000	\$6.3632
Tier III	> 200,000	\$5.1722

¹⁹ See section 3.2.1, *Initial Application of U.S. Full Saturation and Usage Statistics*, of phase 9, *Forecasts of VRS User Demand*.

By applying the above tiered rates to the estimated total minutes of Table 6 above, a forecast for a 24/7 VRS, (serving 17,050 users who average 635 annual minutes per consumer) a forecasted U.S. Ratio cost for Canadian VRS at maturity provided by a single provider is \$58,863,061.²⁰

Table 9: U.S. Ratio – Forecast of Canadian VRS costs at maturity

Canadian VRS Forecast at Maturity	
VRS consumers:	17,050
Average annual minutes per user:	635
Total annual minutes of use:	10,826,750
Forecast annual cost:	\$58,863,061
Average cost per minute:	\$5.4368

3.2. Canadian Forecast Costs

There are two reasons why the Canadian equivalent of the U.S. VRS reimbursement rates (the “U.S. Ratio” forecast) should be considered to be too high for use in Canada. The first is that the U.S. rates are based on a five year average, including three years of vendor reported actual costs plus two years of vendor reported forecast costs. The second is that the vendor reported costs are considered by many to be excessive. These two reasons and their suggested outcomes for an “Canadian Forecast” of rates and costs are presented below.

3.2.1. Incongruities of U.S. rate averaging

As noted by the FCC, its methodology of averaging historic and future cost projections is flawed, and vendor projections of future costs have consistently been overstated:

“The projected costs for VRS for a given Fund year have consistently proven to be higher than actual costs for that Fund year, and there is currently no “true up” mechanism for reconciling, after the Fund year, the rates at which providers are reimbursed from the Fund and their actual costs for the Fund year.”²¹

“A comparative analysis by NECA of providers’ projected and actual cost and demand over the past several years reveals that there is a substantial disparity between providers’ reported projected costs and demand, and what turns out to be their actual costs and demand.”²²

²⁰ This cost does not include general administrative and other program costs discussed in section 5.

²¹ FCC 10-115, Order, In the Matter of Structure and Practices of the Video Relay Service Program, CG Docket 03-123, released June 28, 2010, paragraph 6, at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-10-115A1.doc.

²² Ibid, paragraph 9.

The FCC process of rate setting does not provide any incentive for VRS providers to submit accurate estimates of future costs. There is no penalty for inaccuracy, no effective auditing of provider costs, and there is no reconciliation adjustment of rates or payments resulting from over inflated projections of future costs. Providers are financially incented to submit estimates of unrealistically high future costs since high projections will result in higher reimbursement rates.

This is borne out by the most recent TRS Fund Administrator's public submission to the FCC regarding VRS provider data in which NECA pointed out significant anomalies and cost overages:²³

*"One provider has proposed an increase in its interpreter staff of approximately 57 percent for 2010 and over 62 percent for 2011 when compared to 2009 staffing levels despite consistently meeting speed of answer requirements and submitting a demand projection that remains virtually constant (+2.8%) with the demand reported for compensation in 2009. These projections are the primary cause of the increases in 2010 and 2011. ...While one provider's projected costs contain unreasonable and unsubstantiated growth in headcount, the projected rate proposals contained herein utilize this questionable data as it was submitted."*²⁴

*"There are also wide variations in projected costs among providers. One provider submitted projected costs for 2010 that were below \$2.00 [USD] per minute on one extreme while another submitted costs in excess of \$80 [USD] per minute on the other extreme."*²⁵

*"With the benefit of four years' data showing that providers' projections consistently overstate their costs, we can no longer justify basing VRS compensation rates only on projected costs."*²⁶

According to the report, providers were given the opportunity to revise their cost projections, however none were received. Therefore, the U.S. TRS Fund Administrator (NECA) submitted per minute rate

²³ National Exchange Carrier Association's (NECA) annual submission to the Federal Communications Commission (FCC) of the Interstate Telecommunications Relay Services (TRS) Fund Payment Formula and Fund Size Estimate for July 2010 through June 2011; CC Docket 03-123; CG Docket No. 10-51; April 30, 2010, at <http://fjallfoss.fcc.gov/ecfs/document/view?id=7020443086>. NECA's annual TRS submittal for July 2011 through June 2012 did not contain any analysis of VRS rate costs or rate cost projections: page 14 at <http://fjallfoss.fcc.gov/ecfs/document/view?id=7021341474>.

²⁴ NECA TRS submittal for 2010/2011; pages 18 and 20. Numerically the data suggest that this provider is Sorenson.

²⁵ Ibid. It is assumed that these two providers have comparatively very few annual minutes of VRS traffic.

²⁶ FCC 10-115, Order, In the Matter of Structure and Practices of the Video Relay Service Program, CG Docket 03-123, released June 28, 2010, paragraph 10, at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-10-115A1.doc.

alternatives to the FCC that included the unsubstantiated projected costs for 2010 and 2011 identified above but excluded the costs submitted by the two providers at the extremes (highest and lowest cost).

Since the U.S. VRS rate formula includes unsubstantiated future cost estimates that are consistently higher than actual costs, why should a Canadian VRS reimbursement rate include these unrealistic high estimates? In fact, in its filing NECA also suggested that the FCC should consider only using the historic costs submitted by the VRS providers; that is, those costs that the providers claim are their actual costs for past years, not their projected costs for future years. NECA offered two ways to use the historic costs:

A three year average of actual costs

NECA noted that the average historical costs (weighted across all tiers) for each year, in U.S. dollars was:

Table 10: U.S. historical VRS cost summary, USD²⁷

U.S. Historical Cost Summary	2006	2007	2008	2009
Weighted Average, USD:	\$4.4603	\$3.9604	\$4.1180	\$4.1596

These represent the actual cost to provide VRS as submitted by the VRS providers as described above in section 3.1.1. Based on the provider’s submitted 2009 cost data, NECA offered the following tiered pricing shown below in both U.S. and Canadian dollars:

Table 11: First alternative – NECA suggested U.S. rates based on historical costs

U.S. Historical Costs	Tier 1	Tier 2	Tier 3
U.S. dollars: ²⁸	\$5.7754	\$6.0318	\$3.8963
Canadian dollars:	\$5.8955	\$6.1573	\$3.9773
Decrease from current rates: ²⁹	7.4%	3.2%	23.1%

Historic costs – differential between tiers

NECA then suggested another alternative also based on the 2009 historical costs for the three tiers, but based on the differential between the tiers. NECA offered the pricing “based on the application of the percentages to a composite cost” (the weighted average with a 3.2% growth factor, the additional amount for 9-1-1/10-digit numbering, plus 1.6% of cost of working capital), resulting in the following pricing:

²⁷ NECA TRS submittal for 2010/2011, page 17, Table 2.

²⁸ Ibid, page 25, Table 3.

²⁹ Current rates as shown in sections 3.1.1 and 3.1.2.

Table 12: Second alternative – NECA suggested U.S. rates based on differential of historical costs³⁰

U.S. Historical Costs Differential Basis	Tier 1	Tier 2	Tier 3
U.S. dollars:	\$4.1447	\$3.9797	\$3.8575
Canadian dollars:	\$4.2309	\$4.0625	\$3.9378
Decrease from current rates: ³¹	33.6%	36.2%	23.9%

3.2.2. Excessive expenses reported in U.S. costs

Additionally, there is significant documentation suggesting that the “actual historical costs” reported by the VRS providers contain significantly inflated or excessive amounts, as well as costs that according to regulations should not be reimbursed.³² The subject is actually complex in that it involves differences of understanding between what is allowed as determined by the intent of U.S. law compared to what is allowed as determined by knowledgeable management practice; both contrasted to what is represented and claimed by the providers. For example, U.S. law stipulates that TRS (including VRS) is a service provided by (or funded by) the telecommunication carriers for which the carriers are to be compensated for their costs. The service is not supposed to be compensated at high margins as a profit making enterprise. Yet the high reimbursement rates established by the FCC have established a private VRS for-profit industry completely dependent upon the FCC’s payments at levels far beyond the cost of the service. For a significant description of the issue see the U.S. Congress Committee on Energy and Commerce’s December 9, 2008 Majority Staff Report on its findings of an investigation of the FCC.³³

The issue remains current. In June of 2010 the FCC issued a Notice of Inquiry, which continued to quote the Majority Staff report:

...the House Committee on Energy and Commerce concluded that “[t]here is substantial evidence that the FCC has failed to set reasonable rates for the compensation of TRS

³⁰ NECA TRS submittal for 2010/2011, page 25.

³¹ Current rates as shown in sections 3.1.1 and 3.1.2.

³² Confidential research by Mission Consulting validate this perspective. Examples are cost to provide and install consumers’ VRS equipment, and other inflated or inappropriate costs.

³³ Although the link to the report from the Committee’s news release at <http://democrats.energycommerce.house.gov/index.php?q=archive/110th-congress/committee-releases-staff-report-on-findings-of-fcc-investigation> is not functioning, the report itself is available at <http://www.voiptechchat.com/wp-content/uploads/2008/12/fcc-distrust-report.pdf>. In particular see section 1 and exhibits 3 through 7. For another summary of the issues, see the article, “A Failure of Communication”, The Deal Magazine, Oct. 1, 2010 at <http://www.thedeal.com/magazine/ID/036729/insights/a-failure-of-communication.php>.

providers. As a result, consumers are being significantly overcharged to finance the TRS Fund and TRS providers are being significantly overcompensated.”³⁴

Mr. Thomas Chandler, the past Chief of the FCC’s Disability Right’s Office has often stated that the FCC’s VRS rates are unjustified. When he resigned in March of 2010 he stated:

But the fact is, the “fleecing of America” that resulted from the setting of the VRS rates in 2007 for three years dwarfs the stealing from the Fund through fraud and outright criminal conduct.³⁵

Even today, FCC staff affirms that significant “waste” exists within the current reimbursement rates that surpass the cost estimates attributed to fraud and abuse concerning the reported number of minutes compensated, and that actual costs are unofficially estimated in the range of \$3.50 USD per minute.³⁶ While the overstatement and inappropriateness of costs may be strongly denied by the VRS industry, it is surreptitiously allowed by the combination of vendor self-reporting and lack of effective government oversight.³⁷ In any case a differential of current tiered USD rates (\$6.34/\$6.23/\$5.07) to \$3.50 USD represents a 45% to 31% reduction from current rates.

³⁴ FCC 10-111, Notice of Inquiry, In the Matter of Structure and Practices of the Video Relay Service Program, CG Docket 10-51, released June 28, 2010, paragraph 30, at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-10-111A1.doc.

³⁵ <http://www.edsalert.com/wp-content/uploads/2010/03/farewell-Tom-Chandler-032510.doc>. Note that the rates established in the three-year term continue to be the current U.S. VRS rates with only insignificant modification at the time of this report.

³⁶ See <http://fjallfoss.fcc.gov/ecfs/document/view?id=7021739255>. Also, in private correspondence with Mr. Chandler for this feasibility study, he suggested that average U.S. VRS rates based on costs might more appropriately be around \$3.00 USD per minute.

³⁷ FCC and TRS Fund Administrator audits have proved unable to independently verify provider cost accounting. For example see Exhibit 7 of the December 9, 2008 Majority Staff Report wherein on April 10, 2008 KPMG identified its inability to audit Sorenson due to denied access and redacted records, and on July 30, 2008 depicted significant missing data and inadequate accounting systems of seven other VRS providers; available at <http://www.voiptechchat.com/wp-content/uploads/2008/12/fcc-distrust-report.pdf>.

3.2.3. U.S. rate alternatives

As documented above, the current U.S. VRS rates are inappropriately high due to two independent factors:

1. The current rates include unsupported high forecasted costs self-reported by the providers.
2. Both the historic and forecasted costs reported by the providers are suggested by qualified experts and FCC representative to include significant excessive and disallowed expenses.

Various revised U.S. VRS reimbursement rates have been put forward:

1. NECA officially suggested that tiered rates based only on historical costs would be appropriate (however still based on unaudited costs as represented by the providers) at either \$5.7754/\$6.0318/\$3.8963 USD or \$4.1447/\$3.9797/\$3.8575 USD, per conversation minute.
2. Costs ranging from \$3.50 to \$3.00 USD per conversation minute have been unofficially suggested by current and past FCC staff.

Based on the record presented it is reasonable to conclude that the current U.S. VRS rates are not supportable and should not be applied to Canada for cost forecasting purposes. While the various alternative rates suggested by NECA and the FCC staff are instructive and are offered by knowledgeable subject matter experts, by themselves these alternative rates are also deeply flawed by missing, inaccurate or inappropriate source data. Therefore while these U.S. rate alternatives may be useful for comparative purposes, another analysis based on average Canadian interpreter costs, reasonable call center overhead and profit margins is warranted.

3.2.4. Canadian cost estimates

Interpreter costs

Phase 6 of this feasibility study indicated a range of hourly rates paid to Canadian interpreters of community interpreting. The variances in these pay rates are influenced by the skill level of the interpreter, availability of interpreters (i.e., competitiveness), and by location (general regional and local cost of living factors) – with skill level being the primary factor. These data, supplemented by additional research for this phase 10, indicate that community interpreters are paid from a low of \$15 per hour to a high of \$60 per hour by interpreting agencies, with most paid about \$25 per hour, and up to \$40 or \$45 per hour for highly qualified individuals. Quebec rates (and non-major metropolitan area) pay rates are often at the lower range of this spectrum. For example rates may be \$15 per hour for a junior skilled person, \$20 per hour for an intermediate skilled person, and \$24 to \$30 per hour for a senior level person.³⁸ Highly qualified freelance interpreters with their own clientele (that is, who work directly for the client, and not through an agency) typically receive \$50 to \$60 per hour.

³⁸ Quebec pay rates may tend to be lower due to lack of standards for hiring LSQ interpreters, and the prevalence of LSQ interpreters performing community interpreting without formal interpreter training program certification.

These pay rates are reflective of rates charged by agencies for their services, which are typically \$40 to \$60 per hour for private parties, and \$50 to \$75 per hour for government and some businesses (e.g., \$75/hour for court interpreting).³⁹

In the United States interpreter pay rates for community interpreting are often similar to the Canadian \$25 to \$40/\$45 range, but are lower for VRS interpreting. This is because community interpreting involves travel time to and from the client that is usually not compensated, involves irregular hours (time of day and day of week), irregular frequency (unpredictable requests), and unpredictable duration of assignments (often short, e.g. 20 – 40 minutes). Highly active community interpreters are also often required to market themselves via personal outreach to the Deaf community through community events and networking. The interpreter is not compensated for their marketing time. Thus an active community interpreter spends a significant amount of time in non-compensated activities and in waiting (while keeping available) for assignments.⁴⁰

This is contrasted to VRS employment which, while also part-time, is nevertheless scheduled in advance with regular hours, involves no client travel, no need for personal outreach, no time spent waiting to be employed, and can provide more working hours. Therefore, as occurs in the United States, interpreters are usually paid less per hour for VRS interpreting than for community interpreting. For example U.S. interpreters are typically paid in the range of \$20 to \$35 per hour to work in VRS, depending upon skills (with most averaging about \$25). For VRS in Canada, a high skill level for interpreters is desired. Assuming a community interpreting pay range of \$40 to \$45 per hour for the higher skilled interpreters, this skill level would be expected to receive approximately \$28 to \$35 per hour when working for VRS as part-time employees.⁴¹ This estimated range is considered conservatively high; actual pay rates could be lower depending upon location, availability of skilled interpreters, and market competitiveness.

With an anticipated VRS interpreter pay range of \$28 to \$35 per hour, an average pay rate of \$31.50 per hour may be used for estimating purposes.⁴² To estimate the labor cost to the VRS provider, a load of 33.33% is added for employment taxes, associated benefits, etcetera. Thus an average \$31.50 VRS pay rate will equate to a loaded cost of \$42.00.⁴³ This loaded labor cost of \$42.00 per hour will be used for Canadian VRS cost estimating purposes.

³⁹ Agencies and freelance typically charge a two hour minimum.

⁴⁰ Community interpreters are also often paid by agencies as contractors instead of as part-time employees, thereby requiring the interpreter to pay their own expenses and benefits, and to account for and file their contractor taxes, licenses, etcetera.

⁴¹ This higher Canadian VRS pay rate (compared to the U.S.) also anticipates the potentially greater competition for skilled interpreters than is experienced in the United States.

⁴² While most VRS interpreters will be part-time, a few (e.g., interpreter/supervisors, interpreter/mentors, etc) will be full time. For illustrative purposes the \$28 to \$35 / hour (\$31.50 average) equates to full time equivalent salaries (rate x 2080 annual hours) of \$58,240 to \$73,000 annually (\$65,520 average).

⁴³ $\$31.50 \times 1.3333 = \42.00

Productivity, overhead and profit

Additional considerations for productivity, overhead and profit are necessary in order to develop a VRS reimbursement rate based on labor, overhead and profit. As detailed in this study's phase 9, section 4.2, based on U.S. and other countries' VRS experience this study has recognized an average 25% interpreter efficiency rate for call handling and billing. That is, for every hour worked the VRS interpreter will relay 15 billable conversation minutes. This efficiency average includes the absorption of the overnight hours, which due to low call volumes produces an interpreter efficiency rate of less than 10%.⁴⁴

Overhead costs can vary depending upon the model of VRS service selected. For example, overhead costs will be higher for companies that are required to form in Canada in order to provide VRS, especially when these firms do not have working relationships with either the Deaf community or the interpreter community. Costs to establish facilities, outreach and marketing, recruitment, and so on will be significantly higher than existing firms already involved with ASL or LSQ interpreting. This is noted because the recommendation for the type of provider in this study's phase 11, *Potential Canadian VRS Models*, is that existing organizations involved with ASL and LSQ interpreting as their primary business/function should be primarily considered as potential VRS provider organizations. Additionally, a significant overhead cost for small providers is the VRS platform hardware and software. The phase 11 recommendation is that the platform be acquired by a third party VRS administrator and licensed at a discount to all Canadian VRS providers, thereby further reducing their overhead costs and making entry into the VRS market more affordable.

For these reasons a combined overhead and profit factor is suggested at 35% of revenue. Depending upon an individual organizations' efficiency, an average overhead is expected to be in the range of 20% of revenue, and profit in the range of 15% of revenue. Loaded labor costs of \$42 per hour at 25% billing efficiency should result in a loaded labor cost at 65% of revenue. All these ratios are considered conservative (costs can be lower and profits can be higher).

3.2.5. Canadian Forecast rates

Based on the above percentage estimates of labor, efficiency, overhead and profit, the recommended Canadian VRS provider reimbursement rate for Tier 1 for VRS provider cost forecasting purposes only is \$4.30 per conversation minute.

⁴⁴ In assessing the interpreter efficiency of VRS without service at night, the British Ofcom report cited in this study's phase 9 suggested an improved efficiency rate of 28% which was used in the phase 9 report for non-night and weekend services. However, since the Ofcom efficiency rate was based on "the American experience" and was provided by Sorenson, and since Table 5 indicates the dominance of Sorenson minutes, night coverage by a large provider can be efficiently handled by routing all night calls to one VRS call center. Small independent VRS call centers do not have that option if they are required to provide night service, and therefore they incur significantly lower interpreter efficiencies for low volume night service. The routing and handling of night service should be a topic of an eventual Canadian VRS design, including appropriate cost offsets in provider reimbursements.

At 25% interpreter efficiency, this \$4.30 VRS reimbursement rate generates \$64.50 in revenue per hour worked per interpreter (\$4.30 x 15 minutes = \$64.50). Labor, overhead and profit shown as a percentage of this hour’s revenue are as follows:

Table 13: Breakdown of an hour's VRS revenue at 25% interpreter efficiency, at \$4.30/billable minute

Percentage of revenue	
Loaded labor cost at 65% of \$64.50:	\$41.925
Overhead cost at 20% of \$64.50:	\$12.900
Profit at 15% of \$64.50:	\$9.675
Total hour’s revenue:	\$64.500

The recommended Tier 1 rate is reduced to account for additional efficiencies gained by potential providers that reach Tier 2 and 3 thresholds. The recommended long term provider reimbursement rates for Canadian VRS for cost forecasting purposes only are:

Table 14: Recommended Canadian tiered VRS provider rates, CAD

Recommended per conversation minute VRS rates	Tier 1 less than 100,000 minutes/month	Tier 2 100,000-200,000 minutes/month	Tier 3 more than 200,000 minutes/month
Canadian dollars:	\$4.300	\$4.1000	\$3.8500

While the above Canadian Forecast rates may be appropriate for estimating the long term forecasts of provider costs (fully deployed and over eleven years), actual rates will be affected by the procurement or rate setting methodology selected. These actual rates may be lower since the above Canadian Forecast rates are still more than the self-reported historic costs of the U.S. providers.⁴⁵ How the model selections may influence actual costs will be referenced in section 5.6, *VRS Model Cost Considerations*, and the cost implications of those selections presented in this study’s phase 12, *Final Report*.

The above recommended Canadian tiered VRS provider rates and associated forecast costs will be referred to in this document as the “Canadian Forecast”, and used for both the fully deployed Canadian VRS (operating 24/7/365 with unrestricted access by 100% of consumers who wish to use the service), and for provider costs depicted over time, e.g., eleven years.

The forecasts in the remainder of this cost analysis will depict:

1. Numbers (shown as “U.S. Ratio”) that are based on the U.S. equivalent cost forecasts from section 3.1, U.S. Ratio Costs, above; and the U.S. equivalent forecast number of minutes of VRS from section 3.2, Canadian VRS Forecast Using United States Data, from this study’s phase 9, Forecasts of VRS User Demand.

⁴⁵ Figure 4 and Table 10.

2. Numbers (shown as “**Canadian Forecast**”) that are based on the adjustments to the U.S. rates as recommended in this section 3.2.5, *Canadian Forecast rates*; and the Canadian Forecast number of minutes of VRS from section 3.3, *Canadian VRS Forecast Using Adjusted U.S. Data*, from this study’s phase 9, *Forecasts of VRS User Demand*.

The “**Canadian Forecast**” represents the most probable forecast for Canada for a fully deployed 24 x 7 VRS at an eventual maximum usage rate. The “U.S. Ratio” numbers are shown for comparative purposes only.

3.2.6. Canadian Forecast single VRS provider costs

The results of using the U.S. Ratio and Canadian Forecast numbers for forecasting the VRS provider costs in a single provider Canadian VRS environment are shown below.⁴⁶

Table 15: **U.S. Ratio** - Forecast of single VRS provider costs, at maturity, 24x7⁴⁷

Number of VRS users	Total Annual Minutes	Tier 1 Costs at \$6.3688 per minute	Tier 2 Costs at \$6.3632 per minute	Tier 3 Costs at \$5.1722 per minute	Total Costs (at average of \$5.4362 per minute)
17,050	10,826,750	\$7,642,525	\$7,635,788	\$43,584,747	\$58,863,061

Table 16: **Canadian Forecast** - Forecast of single VRS provider costs, at maturity, 24x7

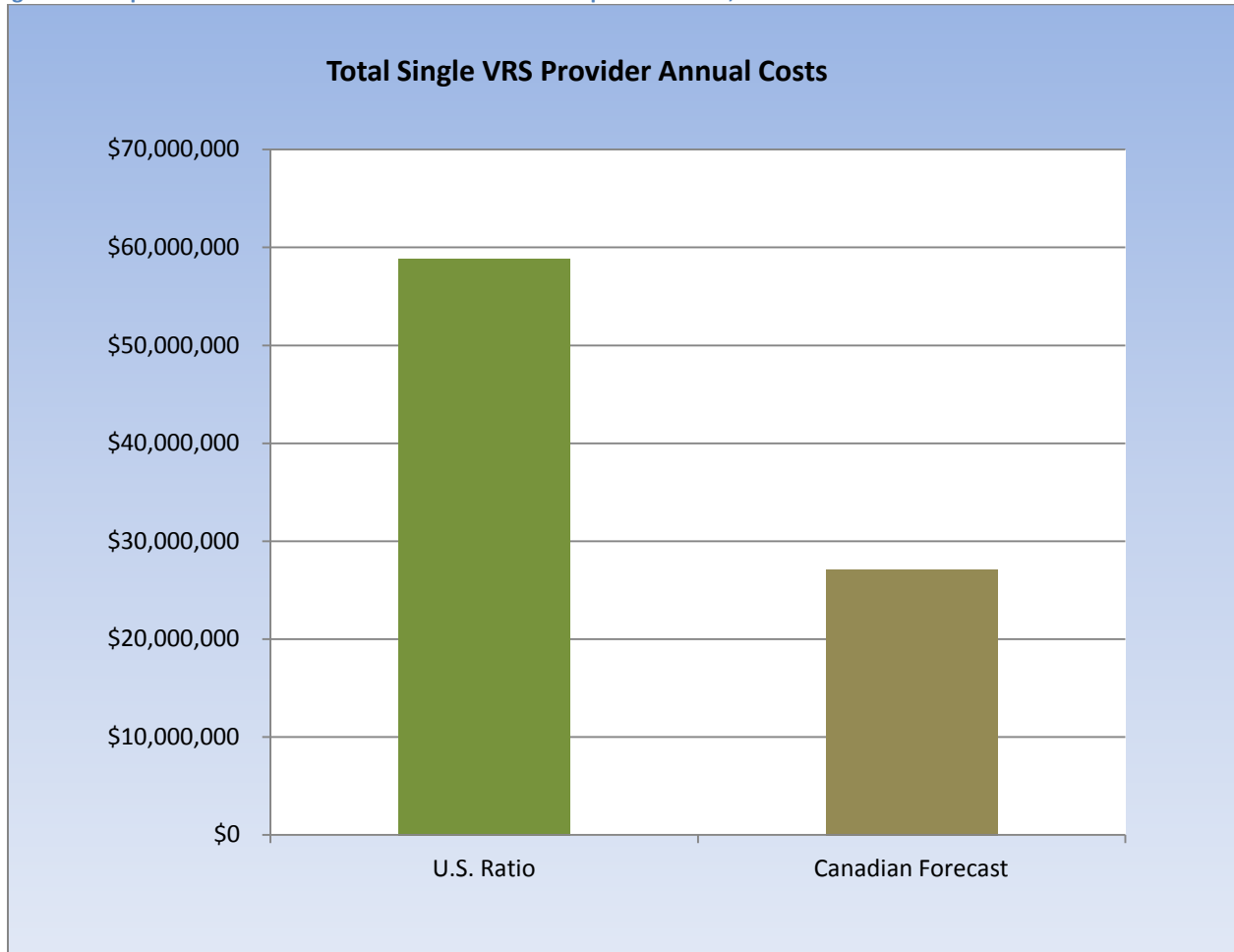
Number of VRS users	Total Annual Minutes	Tier 1 Costs at \$4.3000 per minute	Tier 2 Costs at \$4.1000 per minute	Tier 3 Costs at \$3.8500 per minute	Total Costs (at average of \$3.9732 per minute)
15,345	6,820,853	\$5,160,000	\$4,920,000	\$17,020,282	\$27,100,282

A graphic relationship of the U.S. Ratio provider costs (using U.S. equivalent minutes of use and the current U.S. reimbursement rates) and the Canadian Forecast provider costs (using the reduced minutes of use and the reduced reimbursement rates) is presented in Figure 8, below. The Canadian Forecast is the probable long term annual single VRS provider cost for Canada for a fully deployed and subscribed VRS operating 24x7.

⁴⁶ The forecasts of provider costs for an environment of multiple VRS providers are discussed in section 4.4.

⁴⁷ Refer to section 3.1.2 for details.

Figure 8: Comparison of U.S. Ratio to Canadian Forecast VRS provider costs, 24x7



4. Cost Variables

There are many different factors that may impact the above cost forecasts. The principal VRS cost variables will be discussed below. Some can be reasonably estimated, while others are difficult to predict. Whether or not to accept these factors, or to consider their implications, will in many instances be a matter of policy.

4.1. Population Demographics

To arrive at reasonably accurate forecasts of VRS costs, fairly precise data on the size of the user population and their VRS usage is required. As noted in the phase 3, *Consumer Interests and Perspectives*, efforts to gather accurate data on the potential VRS consumer population have been limited. Researchers and stakeholders do not necessarily agree on the size of the Canadian population identified as Deaf, hard of hearing, or those who may benefit from a VRS program.

Representative opinions on this issue include:

“... while we have expertise in VRS, nobody can claim to have enough expertise in the Canadian VRS market to make such assertions.”

“We do not know how many Deaf Canadians know ASL/LSQ.”

“We cannot easily predict the number of minutes each Deaf Canadian will use VRS.”⁴⁸

“It is the opinion of the Canadian Association of the Deaf that no fully credible census of Deaf, deafened, and hard of hearing people has ever been conducted in Canada.”⁴⁹

While this study has attempted to define the population of ASL and LSQ users in Canada as accurately as possible, it is probable that these estimates are not as accurate as hoped for. The VRS usage demand analysis of phase 9, *Forecasts of VRS User Demand*, also differentiated the number of expected VRS users from the population of people who sign. The number of expected users and their average annual minutes of use were used to calculate the total annual minutes of use against which the tiered costs were applied. Therefore if the actual number of users is different from the estimate, the costs will be similarly affected. The following tables illustrate the changes to overall annual costs associated with potential changes in the number of users in a single VRS provider environment.

Table 17: U.S. Ratio - Changes in single provider costs for variances in number of VRS users of a 24x7 VRS

Percent change in number of VRS users	Number of VRS users	Total Annual Minutes at 635 min/user	VRS provider Costs
-20%	13,640	8,661,400	\$47,663,461
-10%	15,345	9,744,075	\$53,263,261
0%	17,050	10,826,750	\$58,863,061
+10%	18,755	11,909,425	\$64,462,861
+20%	20,460	12,992,100	\$70,062,661

⁴⁸ Response to the CRTC’s Request for Further Information Following GoAmerica’s November 21, 2008 Presentation at CRTC Public Hearing Telecom Public Notice CRTC 2008-8; Unresolved Issues Related to the Accessibility of Telecommunications and Broadcasting Services to Persons with Disabilities; December 23, 2008; pages 3-5

⁴⁹ Canadian Association of the Deaf, Position Paper on Statistics at www.cad.ca/statistics_on_deaf_canadians.php.

Table 18: Canadian Forecast - Changes in single provider costs for variances in number of VRS users of a 24x7 VRS

Percent change in number of VRS users	Number of VRS users	Total Annual Minutes	VRS Provider Costs
-20%	12,276	5,456,682	\$22,848,226
-10%	13,811	6,138,990	\$24,475,110
0%	15,345	6,820,853	\$27,100,282
+10%	16,880	7,503,160	\$29,727,166
+20%	18,414	8,185,024	\$32,352,339

4.2. Average Minutes of Use per Consumer May Vary

The forecast of a total annual cost based on the U.S. average of 635 (U.S. Ratio) or the Canadian Forecast at 444.5 annual minutes of VRS use per average consumer may be higher or lower than the usage rate that Canadian consumers will employ. Total single provider costs of a fully subscribed 24 x 7 VRS with alternative average minutes per VRS user are shown in the following two tables. The baseline forecast of each is shown in bold.

Table 19: U.S. Ratio – Changes in annual single provider cost for variances in minutes per user, for 17,050 users, 24x7

Average Annual Minutes per User	Average Minutes per Month	Total Annual Minutes	Average Cost per Minute	Total Annual Cost
335	28	5,711,750	\$5.6738	\$32,407,312
435	36	7,416,750	\$5.5585	\$41,225,895
535	45	9,121,750	\$5.4863	\$50,044,478
635	53	10,826,750	\$5.4368	\$58,863,061
735	61	12,531,750	\$5.4008	\$67,681,644

Table 20: Canadian Forecast – Changes in annual single provider cost for variances in minutes per user, for 15,345 users, 24x7

Average Annual Minutes per User	Average Minutes per Month	Total Annual Minutes	Average Cost per Minute	Total Annual Cost
235	20	3,602,075	\$4.0829	\$14,723,389
345	29	5,294,025	\$4.0087	\$21,221,996
444.5	37	6,820,853	\$3.9732	\$27,100,282
545	45	8,363,025	\$3.9504	\$33,037,646
645	54	9,897,525	\$3.9349	\$38,945,471

While the above tables are illustrative of the effect of potential differences in consumer usage, they may also be used to gauge the effect of potential restrictions on consumers' usage that may be imposed by policy in order to limit or control the overall program costs.

4.3. Delays in Adoption of VRS

4.3.1. Factors that may delay full implementation

There are a number of factors that may delay full implementation, and thus reduce initial program costs. These include, in an anticipated descending order of significance:

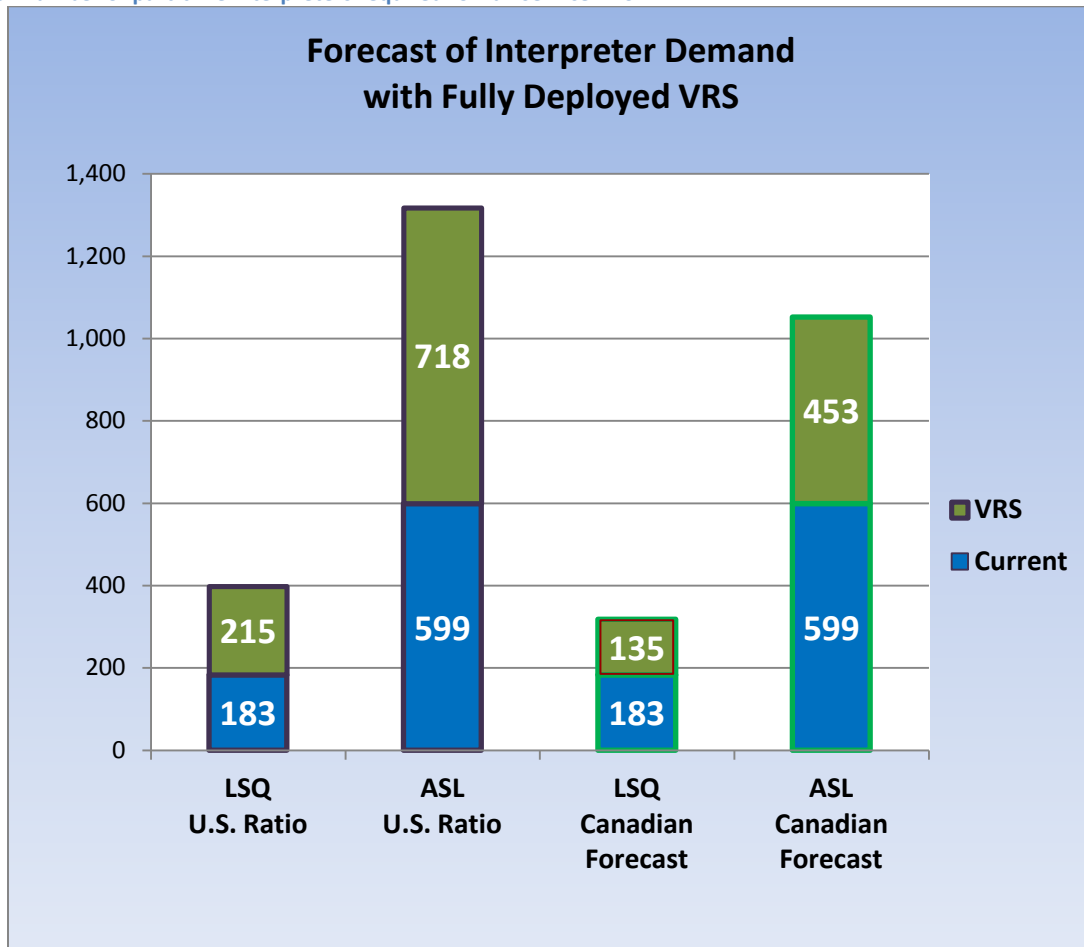
- Not enough interpreters to meet the consumers' demand for service
- Initial lack of funds to pay for full service
- Inability of consumers to acquire hardware and/or broadband services
- Lack of sufficient consumer training or support

Lack of Interpreters

As demonstrated in this study's phase 9, section 4, a fully subscribed VRS will require significant numbers of qualified Video Interpreters. The chart below illustrates the numbers of interpreters required for full implementation of VRS, 24x7, serving 17,050 sign language users, each averaging 635 annual minutes of use (the U.S. Ratio); or serving 15,345 users averaging 444.5 annual minutes (the Canadian Forecast). The forecast of the number of interpreters needed assumes an average of 15 VRS interpreting hours per week per Video Interpreter, with an efficiency rating of 25%.⁵⁰ The Canadian Forecast represents the most probable forecast for Canadian VRS.

⁵⁰ See this study's phase 9, *Forecasts of VRS User Demand*, section 4.2 for a more thorough description of how the number of required VRS interpreters is derived.

Figure 9: Number of part-time interpreters required for full service VRS 24 x 7



If the above number of interpreters are not available for VRS, and if it takes years to develop the necessary pool of interpreters, then the total Canadian Forecast usage (6,820,853 annual minutes of use) will not be realized until there are enough interpreters to handle the traffic. Therefore, the usage or adoption rate of VRS will occur over time. While this should not affect the eventual usage of VRS (assuming that enough interpreters eventually become available), it will cause the costs of VRS to be reduced during the years before the total interpreter resources needed are available.

Lack of Funding

Likewise, lack of approved initial funding may also cause a similar limitation on the degree that the service is made available. Funding constraints can impose limitations on number of interpreters hired or result in other factors that limit access or service. While it is impossible at this point to predict funding outcomes, initially reduced funding is offered as a consideration.

Inability of consumers to acquire hardware and/or broadband services

As stated in this study's phase 5, *Technologies and Their Forecasts*, end user VRS equipment and broadband service represent an expense that may not be affordable by all potential VRS users.⁵¹ To the degree that some consumers cannot afford these items and to the degree that their costs are not borne by the VRS program, by the VRS vendor(s), or by other provincial or local government programs, then delays in VRS consumer adoption of the service will result.

Lack of sufficient consumer training or support

Many VRS consumers will likely need assistance in setting up their VRS hardware or software. Trained vendor personnel will need to be available to provide initial support. If support is not available to meet the demand, then the implementation and adoption rate will be diminished.

4.3.2. The effect of the above factors on initial costs

While it is impossible to predict how the adoption rate will be affected, scenarios can be portrayed that will provide an appreciation for their possible effect on costs. For example, using a delayed ten year implementation, annual costs can be predicted as detailed below.⁵² A ten year growth or adoption timeframe was selected as the shortest time anticipated for the most significant constraint (the interpreter shortage) to be met. Since it takes a minimum of five years to develop an ASL or LSQ interpreter, and since the Canadian college and university programs currently graduate only a small number of interpreters, and since almost all such programs have indicated that they are presently not able to increase the size of their programs (expand to graduate more students), it is therefore assumed that it will take at least ten years to develop the number of interpreters required for full VRS adoption, (i.e., to serve all forecast VRS users).⁵³ Even the assumption that the required increase in interpreters can be met within ten years is based on a rapid and sustained increase in the training capabilities of current Canadian interpreter training programs. Therefore while ten years is offered as a target, some experts in the interpreter training field may suggest that ten years is optimistic.

In any case, ten years is offered as a model against which numerous variables will compete for influence. If a constraining variable such as funding or interpreter availability is never totally resolved, the total VRS program costs will continue at a reduced amount without reaching the higher cost levels depicted in the ten year growth tables and charts or as estimated for a fully mature service. In fact some variables may

⁵¹ See the phase 5 research summary for details on types of equipment and broadband services, and their costs.

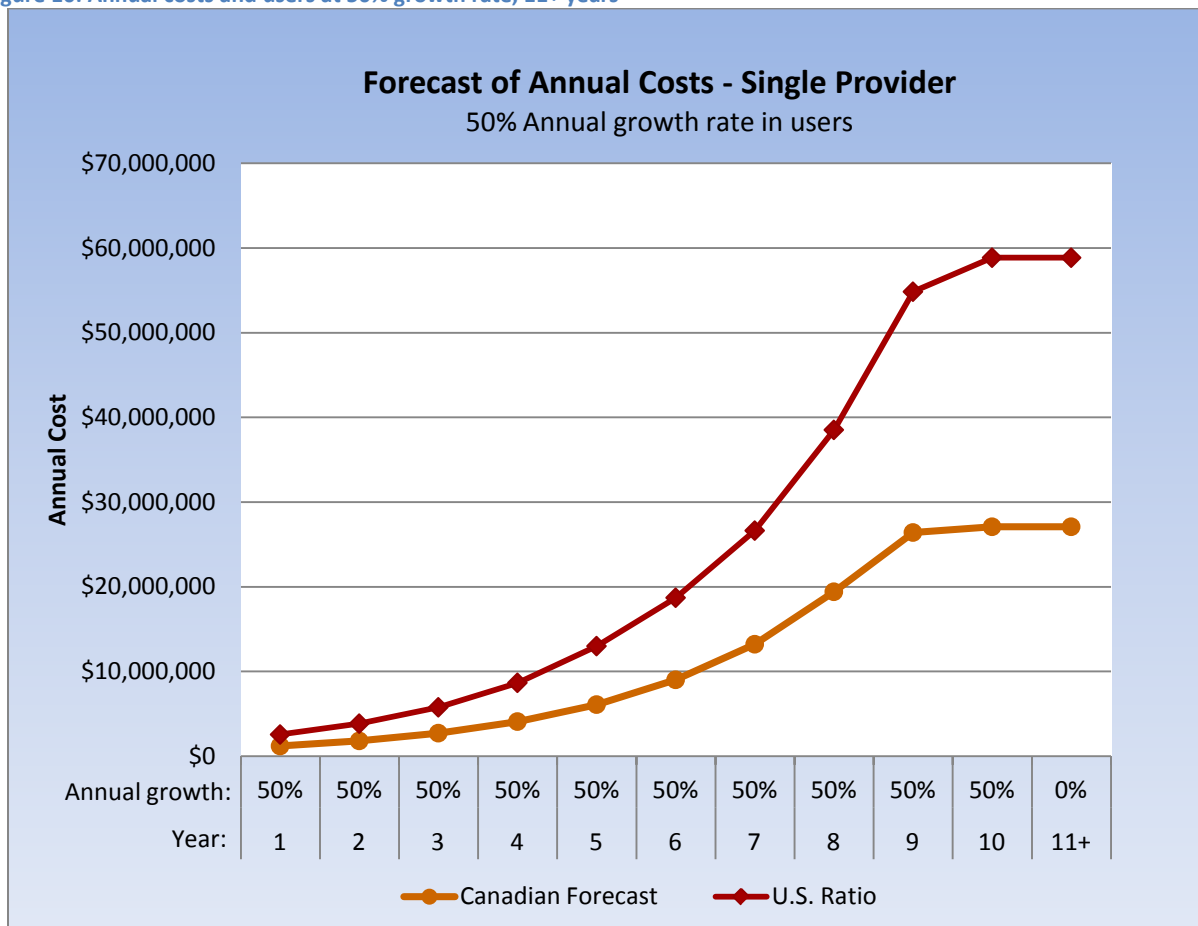
⁵² Ten years is reference here because full consumer subscription to VRS (and the resulting need for the maximum number of interpreters identified in section 4.3.1.) is forecast during the tenth year, even though the charts and tables in this section present eleven years of data.

⁵³ Ten years was established as the most reasonable expectation with the advice and unanimous concurrence of this study's VRS Advisory Committee members.

be manipulated by policy to cause usage and costs to match funding limits or other considerations. Again, in these instances total program costs may remain constant at a significantly reduced level.⁵⁴

By applying the 24/7 forecasted VRS traffic volumes from the phase 9, *Forecasts of User Demand*, which use *monthly* growth patterns that reflect projected growth based on a month-to-month compounded increase of users with approximately 500 users the first month, the per month U.S. Ratio and Canadian Forecast traffic volumes were determined and were then applied to the earlier forecast to achieve the average VRS cost estimate. This means that as the services expand, and volume exceeds either the Tier I or Tier II service thresholds, the applied rates would represent a lower average cost per minute. These monthly costs were then applied to the yearly forecast and a yearly average cost, and total cost projection was established. The results are shown in Figure 10 and Table 21 showing the U.S. Ratio data and Table 22 showing the Canadian Forecast data, below.⁵⁵

Figure 10: Annual costs and users at 50% growth rate, 11+ years



⁵⁴ See this study’s phases 6 and 9 for additional discussion on this topic.

⁵⁵ Note that in this and similar tables the costs shown may vary slightly due to rounding and other minor compounded calculation differences. The average costs per minute are based on the suggested tiers, and are rounded to two decimal places for viewing in the table but not in the calculations.

The above chart is derived from the “Total Annual Cost” column presented in the following two tables.

Table 21: U.S. Ratio – 50% annual growth rate over 11+ years, single provider

Year	Annual Growth Rate	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
1	50%	750	279,620	\$ 2,570,070	\$6.37
2	50%	1,125	419,430	\$ 3,855,105	\$6.37
3	50%	1,688	629,127	\$ 5,782,489	\$6.37
4	50%	2,532	943,873	\$ 8,674,450	\$6.37
5	50%	3,798	1,415,920	\$ 13,008,239	\$6.37
6	50%	5,697	2,123,770	\$ 18,717,748	\$6.11
7	50%	8,546	3,185,600	\$ 26,643,683	\$5.80
8	50%	12,819	4,778,657	\$ 38,534,910	\$5.59
9	50%	17,050	6,896,470	\$ 54,850,418	\$5.46
10	50%	17,050	10,826,750	\$ 58,863,061	\$5.44
11+	0%	17,050	10,826,750	\$ 58,863,061	\$5.44

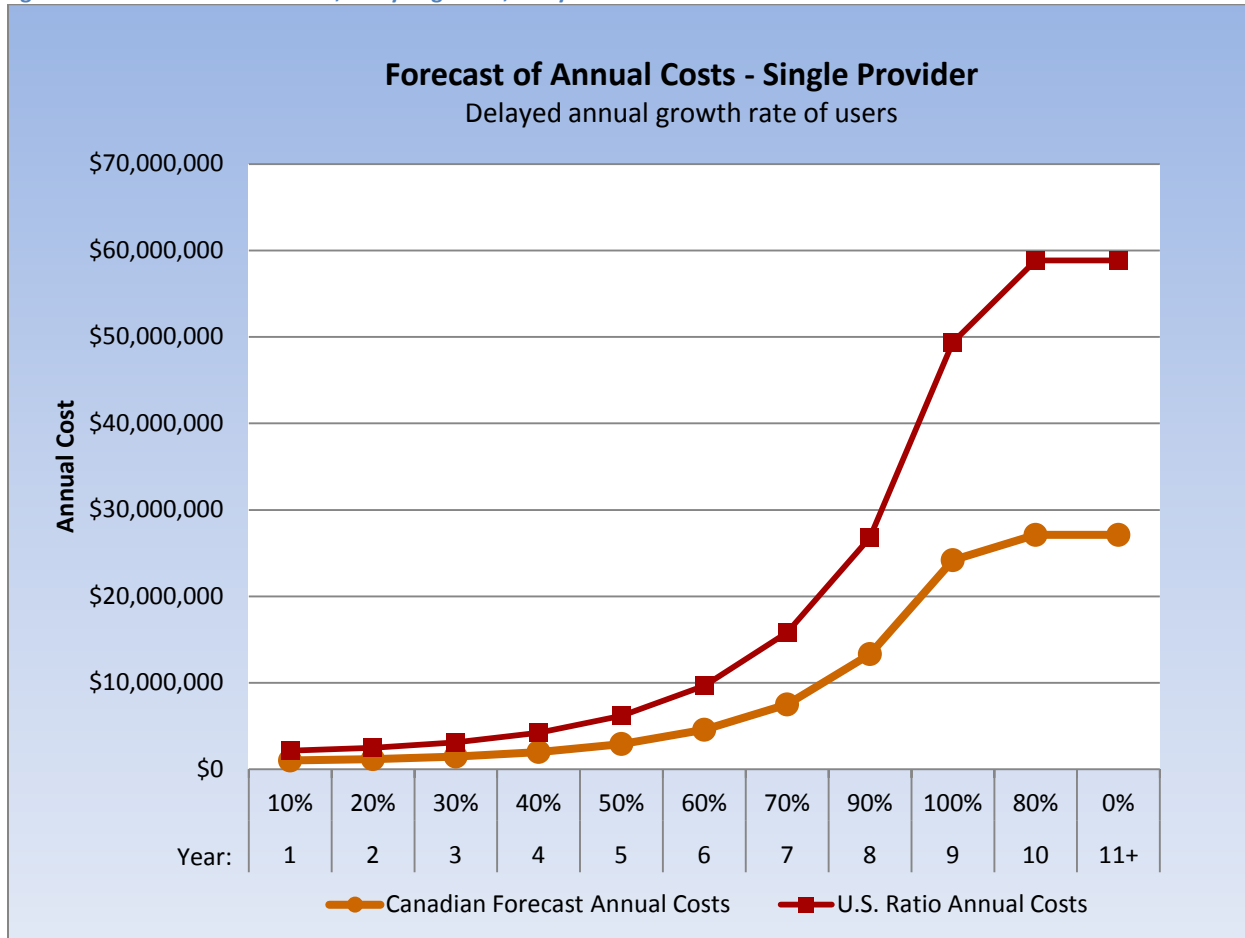
Table 22: Canadian Forecast – 50% annual growth rate over 11+ years, single provider

Year	Annual Growth Rate	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
1	50%	750	282,480	\$ 1,214,663	\$4.30
2	50%	1,125	423,720	\$ 1,821,994	\$4.30
3	50%	1,688	635,561	\$ 2,732,912	\$4.30
4	50%	2,532	953,527	\$ 4,100,164	\$4.30
5	50%	3,798	1,430,401	\$ 6,104,187	\$4.27
6	50%	5,697	2,145,490	\$ 9,032,460	\$4.21
7	50%	8,546	3,218,180	\$ 13,229,993	\$4.11
8	50%	12,819	4,827,529	\$ 19,425,988	\$4.02
9	50%	15,345	6,644,423	\$ 26,421,029	\$3.98
10	50%	15,345	6,820,853	\$ 27,100,282	\$3.97
11+	0%	15,345	6,820,853	\$ 27,100,282	\$3.97

Note that in all of the tables that show costs over ten or more years, the total annual cost for the first year in which the maximum number of users is reached is less than the estimated total cost of the subsequent years because the first year of achieving maximum users includes some months with fewer than the maximum total VRS users. It is important to realize that the “Number of VRS Users” is simply used to generate the total minutes as a function of an average of minutes per user only for computation purposes.

The same concept of growth over a ten year period may in fact result in something other than a constant 50% annual growth. For example the development of interpreters (or impact of another constraint) may take longer, i.e., fewer interpreters the first six years, followed by higher rates of availability in subsequent years. The potential effect of delayed interpreter availability on the ability to handle consumers’ VRS demand (minutes of use) and resulting annual costs are depicted in Figure 11 and Table 23 and Table 24, below.

Figure 11: Annual costs and users, delayed growth, 11+ years



The above chart is derived from the “Total Annual Cost” column presented in the following two tables.

Table 23: U.S Ratio – Initially delayed growth followed by increased rate, 11+ years, single provider

Year	Annual Growth Rate	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
1	10%	550	334,751	\$ 2,131,951	\$6.37
2	20%	660	387,138	\$ 2,465,595	\$6.37
3	30%	858	487,363	\$ 3,103,900	\$6.37
4	40%	1,201	662,887	\$ 4,221,776	\$6.37
5	50%	1,802	969,063	\$ 6,171,740	\$6.37
6	60%	2,883	1,516,168	\$ 9,654,354	\$6.37
7	70%	4,901	2,524,866	\$ 15,800,643	\$6.26
8	90%	9,312	4,629,309	\$ 26,808,721	\$5.79
9	100%	17,050	8,989,378	\$ 49,359,822	\$5.49
10	80%	17,050	10,826,750	\$ 58,863,061	\$5.44
11+	0%	17,050	10,826,750	\$ 58,863,061	\$5.44

Table 24: Canadian Forecast – Initially delayed growth followed by increased rate, 11+ years, single provider

Year	Annual Growth Rate	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
1	10%	550	234,326	\$ 1,007,600	\$4.30
2	20%	660	270,997	\$ 1,165,286	\$4.30
3	30%	858	341,154	\$ 1,466,961	\$4.30
4	40%	1,201	464,021	\$ 1,995,290	\$4.30
5	50%	1,802	678,344	\$ 2,916,879	\$4.30
6	60%	2,883	1,061,318	\$ 4,561,592	\$4.30
7	70%	4,901	1,767,406	\$ 7,486,365	\$4.24
8	90%	9,312	3,240,516	\$ 13,314,780	\$4.11
9	100%	15,345	6,061,387	\$ 24,176,341	\$3.99
10	80%	15,345	6,820,853	\$ 27,100,282	\$3.97
11+	0%	15,345	6,820,853	\$ 27,100,282	\$3.97

4.4. Dividing the Service Among Two or More Providers

4.4.1. Cost and expense considerations

The requirement to provide video relay services in more than one language increases the complexity of the overall program, but does not materially increase costs. The language environment in Canada requires that VRS is provisioned in four languages: English, ASL, French and LSQ. Therefore, a schedule of interpreters for any given time of day needs to be able to address the traffic associated with two distinct calling queues. Since the VRS consumers and sign language interpreters typically communicate in either ASL/English or LSQ/French, the scheduling requirement must anticipate the use of two different interpreter pools to provide coverage of anticipated call flows.

Scheduling of interpreter resources is based on anticipated call patterns that may or may not be duplicated or precisely predictable. While previous trends in traffic volume may provide a forecast for the number of interpreters required for any given day, peak period or hours of the day, the moment-by-moment pairing of calls to available interpreters to achieve short *average speed of answer* times is challenging. Any excess that occurs in the availability of interpreters versus the calls that are presented creates inefficiency and higher labor costs.

An additional factor that can decrease provider efficiencies may be the VRS model Canada elects to implement. If the model anticipates many VRS providers instead of one, each provider will have a fewer number of interpreters to offset their expenses.

For example, in the United States, all providers that offer VRS in Spanish have an equal requirement to meet the call volume and ASA parameters in either language 24 hours a day. The VRS traffic overnight is extremely low compared to day time traffic. Nonetheless, a provider typically should have at least two

interpreters scheduled at any hour of the night to cover the calls that may be presented.⁵⁶ If the Canadian model is for multiple providers to divide the available evening traffic, the number of potentially idle interpreters scheduled for any calls during the night multiplies.

This issue focuses on the negative implications of covering two languages and multiple providers, and also identifies the inefficiency of overnight coverage necessary to provide equitable service. In reality, the provision of multiple languages in the United States is still profitable based on the daily traffic and per/minute reimbursement rates currently offered by the FCC and TRS Fund Administrator. It should be noted that normal call center economies of scale are also constrained in that VRS call centers are typically limited in size by the availability of interpreters in the local vicinity of the call center. Physical VRS call centers can often be limited to ten seats or less. Economies of scale are only realized when these multiple VRS call centers are networked together as one large virtual call center, which may or may not be possible, depending upon the VRS model selected for Canada

In Canada other visual languages that may be considered for VRS, such as Speech-Reading, may be considered based on the need of additional interpreter skills.⁵⁷ If they can be professionally satisfied by an existing interpreter pool, then the cost of training and the provision of the service would be low. In the case of Speech-Reading, it is anticipated that the demand would be low and that interpreters who were employed to handle Canadian VRS would not require significant training.

4.4.2. The effect of two providers on forecast costs

For comparative purposes and using the same methodology, a variation was created that attributed 23% of the traffic volume each month to a second vendor, specializing in LSQ. As the per month volume for each was reduced from a single vendor model, the average cost per minute for each increased using the tiered rate structure, but with an overall cost difference of only 2.3% for the Canadian Forecast. The forecast usage and costs of two providers operating 24 x 7, serving a total of 15,345 Canadian Forecast consumers (or 17,050 U.S. Ratio) with 77% ASL/English and 23% LSQ/French, that average 444.5 minutes each (or 635 minutes U.S. Ratio) is presented in the following two tables. These combined totals of the ASL and LSQ services then contrasted to the total forecast for a single provider serving the same consumer population and with the same usage rates.

⁵⁶ There are no time limits for VRS calls in the United States. It is conceivable that a VRS call may last more than an hour or two. If there is only one interpreter scheduled, any other callers to VRS during that two hour period would be placed 'on hold' in the queue. Furthermore, that interpreter would physically not be able to interpret with quality for that amount of time without switching with another interpreter to take a break. ASA is not the only factor in scheduling.

⁵⁷ See this study's phases 3, 8 and 9 for additional information on this topic.

Table 25: U.S. Ratio – Comparison of single provider costs versus two provider costs⁵⁸

Provider	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
Provider # 1 – ASL at 77%:	13,128	8,336,915	\$45,985,163	\$5.52
Provider # 2 – LSQ at 23%:	3,922	2,490,470	\$15,746,242	\$6.32
Total of both providers	17,050	10,827,385	\$61,731,404	\$5.70
Single provider estimates:	17,050	10,826,750	\$58,863,061	\$5.44
Differences:			\$2,868,343	\$0.26

Table 26: Canadian Forecast – Comparison of single provider costs versus two provider costs

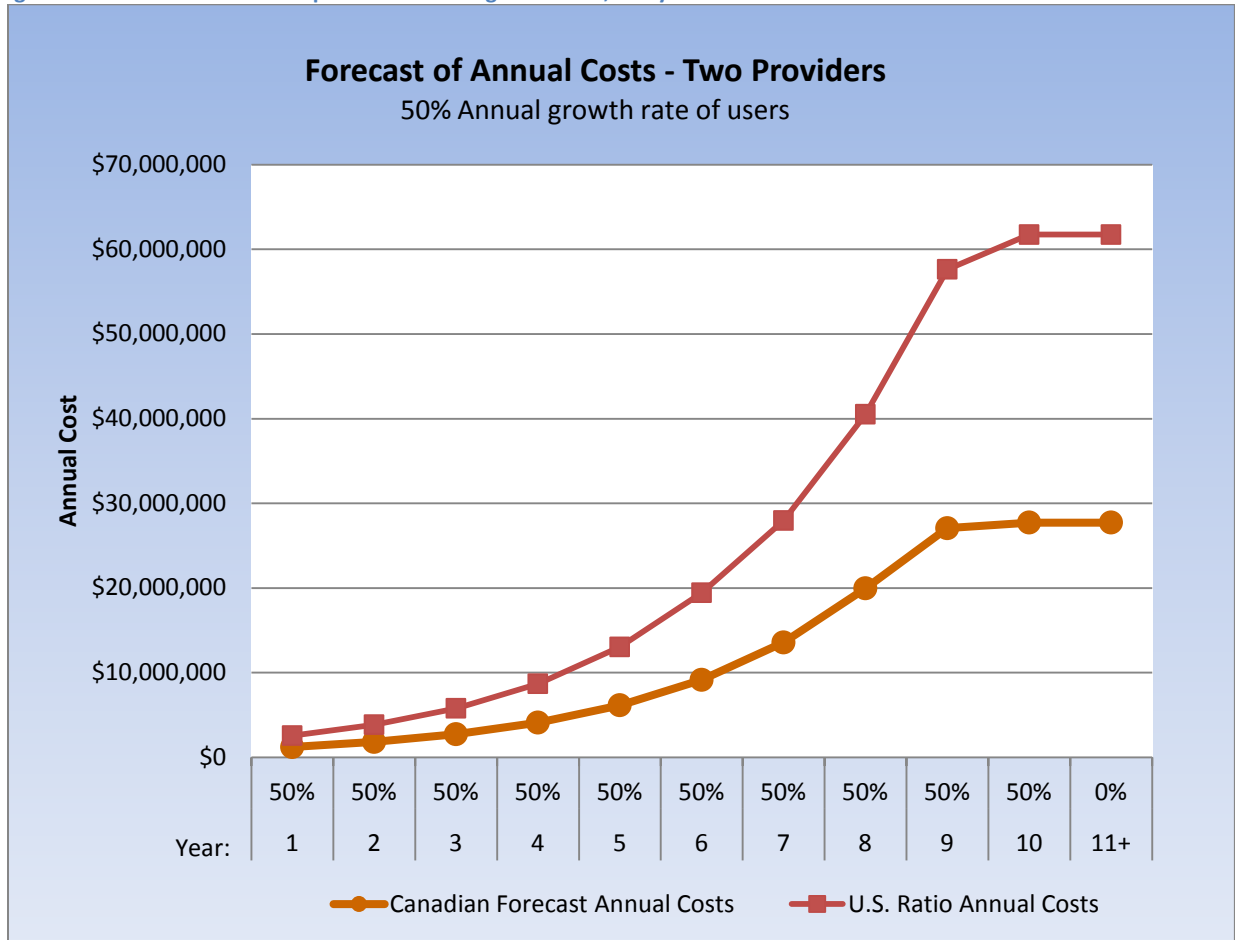
Provider	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
Provider # 1 – ASL at 77%:	11,816	5,252,212	\$21,061,016	\$4.01
Provider # 2 – LSQ at 23%:	3,529	1,568,641	\$6,671,426	\$4.25
Total of both providers	15,345	6,820,853	\$27,732,442	\$4.07
Single provider estimates:	15,345	6,820,853	\$27,100,282	\$3.97
Differences:			\$632,160	\$0.10

Applying the initially delayed implementation presented in section 4.3 to each provider results in the first ten year costs shown below, prior to the full implementation costs depicted above for years eleven and beyond. Two delayed scenarios are presented, a 50% annual growth rate, and a further initially delayed growth that uses the same growth rates presented above in section 4.3.2: 10%, 20%, 30%, 40%, 50%, 60%, 70%, 90%, 100%, 80%, and 0% for years 11 and beyond.

The costs per year for two VRS providers (ASL and LSQ), based on a 50% annual growth rate is shown in Figure 12, below.

⁵⁸ Differences in some numbers in this and the following table are due to rounding. Original numbers were derived on a spreadsheet.

Figure 12: Annual costs for two providers at 50% growth rate, 11+ years



In all charts and tables “Year 11” represents fully deployed and subscribed ongoing service costs for year 11 and annually thereafter, while the maximum number of users is reached during year 10 or earlier. ASL and LSQ portions are 77% and 23% respectively.

The above chart is derived from the “Total Annual Cost” column presented in the next two tables.

Table 27: U.S. Ratio – Two providers’ combined costs; 50% annual growth rate, 11+ years

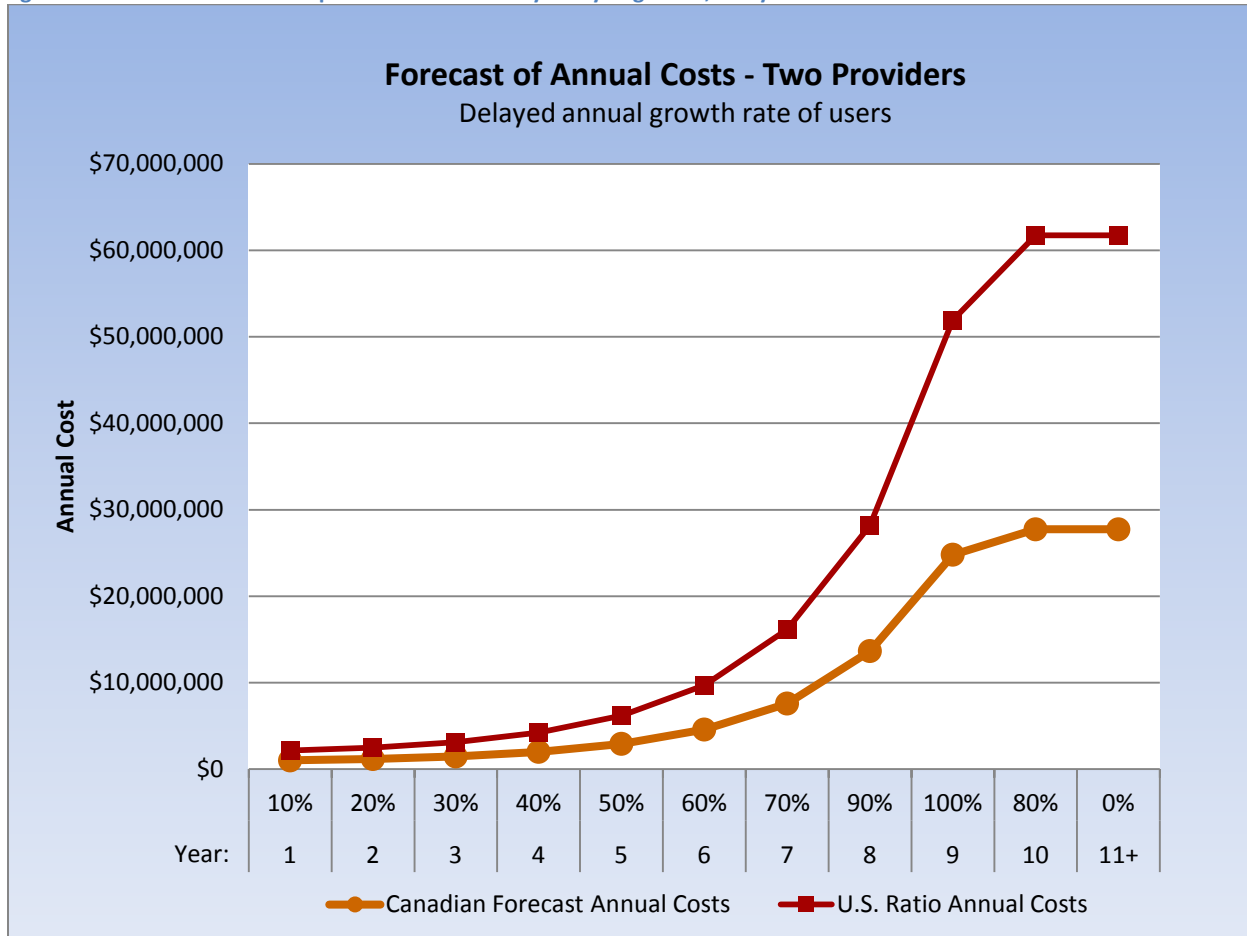
Year	Annual Growth Rate	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
1	50%	751	403,437	\$ 2,569,396	\$6.37
2	50%	1,127	606,055	\$ 3,859,823	\$6.37
3	50%	1,691	909,532	\$ 5,792,599	\$6.37
4	50%	2,537	1,364,668	\$ 8,691,237	\$6.37
5	50%	3,806	2,047,346	\$ 13,036,971	\$6.37
6	50%	5,709	3,071,389	\$ 19,438,181	\$6.33
7	50%	8,564	4,607,137	\$ 27,965,835	\$6.07
8	50%	12,846	6,911,128	\$ 40,516,567	\$5.86
9	50%	17,051	10,063,004	\$ 57,633,045	\$5.73
10	50%	17,051	10,827,385	\$ 61,731,404	\$5.70
11+	0%	17,051	10,827,385	\$ 61,731,404	\$5.70

Table 28: Canadian Forecast – Two providers' combined costs; 50% annual growth rate, 11+ years

Year	Annual Growth Rate	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
1	50%	751	282,406	\$ 1,214,344	\$4.30
2	50%	1,127	424,238	\$ 1,824,224	\$4.30
3	50%	1,691	636,672	\$ 2,737,690	\$4.30
4	50%	2,537	955,268	\$ 4,107,650	\$4.30
5	50%	3,806	1,433,142	\$ 6,159,244	\$4.30
6	50%	5,709	2,149,972	\$ 9,154,084	\$4.26
7	50%	8,564	3,224,996	\$ 13,569,820	\$4.21
8	50%	12,846	4,837,790	\$ 19,963,613	\$4.13
9	50%	15,345	6,648,905	\$ 27,060,962	\$4.07
10	50%	15,345	6,820,853	\$ 27,732,442	\$4.07
11+	0%	15,345	6,820,853	\$ 27,732,442	\$4.07

Applying the delayed annual growth rates of 10%, 20%, 30%, 40%, 50%, 60%, 70%, 90%, 100%, 80%, and 0% for years 11 and beyond to two VRS providers (ASL and LSQ) results in the following costs per year:

Figure 13: Annual costs for two providers with initially delayed growth, 11+ years



The above chart is derived from the “Total Annual Cost” column presented in the next two tables.

Table 29: U.S. Ratio – Two providers’ combined costs; initially delayed growth rate, 11+ years

Year	Annual Growth Rate	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
1	10%	551	334,857	\$ 2,132,625	\$6.37
2	20%	661	387,720	\$ 2,469,303	\$6.37
3	30%	860	487,998	\$ 3,107,944	\$6.37
4	40%	1,204	664,422	\$ 4,231,550	\$6.37
5	50%	1,807	971,709	\$ 6,188,591	\$6.37
6	60%	2,892	1,520,455	\$ 9,683,135	\$6.37
7	70%	4,916	2,532,803	\$ 16,126,355	\$6.37
8	90%	9,341	4,643,543	\$ 28,161,675	\$6.06
9	100%	17,051	9,009,168	\$ 51,911,944	\$5.76
10	80%	17,051	10,827,385	\$ 61,731,404	\$5.70
11+	0%	17,051	10,827,385	\$ 61,731,404	\$5.70

Table 30: Canadian Forecast – Two providers’ combined costs; initially delayed growth rate, 11+ years

Year	Annual Growth Rate	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
1	10%	551	234,400	\$ 1,007,919	\$4.30
2	20%	661	271,404	\$ 1,167,038	\$4.30
3	30%	860	341,598	\$ 1,468,872	\$4.30
4	40%	1,204	465,095	\$ 1,999,909	\$4.30
5	50%	1,807	680,196	\$ 2,924,843	\$4.30
6	60%	2,892	1,064,318	\$ 4,576,568	\$4.30
7	70%	4,916	1,772,962	\$ 7,586,059	\$4.28
8	90%	9,341	3,250,480	\$ 13,655,803	\$4.20
9	100%	15,345	6,071,463	\$ 24,800,230	\$4.08
10	80%	15,345	6,820,853	\$ 27,732,442	\$4.07
11+	0%	15,345	6,820,853	\$ 27,732,442	\$4.07

The above calculations are examples from many different possible provider and growth scenarios, as well as possible application of other variables.

4.4.3. The effect of multiple providers on forecast costs

In this study’s phase 11, *Potential Canadian VRS Models*, section 5 also offers the possibility that instead of one or two providers, there may be multiple small providers; for example, 10 to 20 VRS providers. All such providers would be billing within the Tier 1 threshold (less than 100,000 minutes per month) for fully deployed 24x7 VRS.⁵⁹ In this scenario a fully deployed VRS operating 24x7 would incur the following provider costs at maturity (100% of anticipated users).

⁵⁹ The Canadian Forecast 6,820,853 annual minutes divided by 12 months = 568,404 minutes per month. 568,404 divided by 100,000 = 5.7. Therefore six or more providers equally sharing traffic will each relay less than 100,000 monthly minutes, which is the Tier 1 threshold. The same formula for the U.S. Ratio data results in all Tier 1 minutes for nine or more providers equally sharing the traffic.

Table 31: U.S. Ratio – Comparison of multiple provider costs versus one and two provider costs, at full maturity

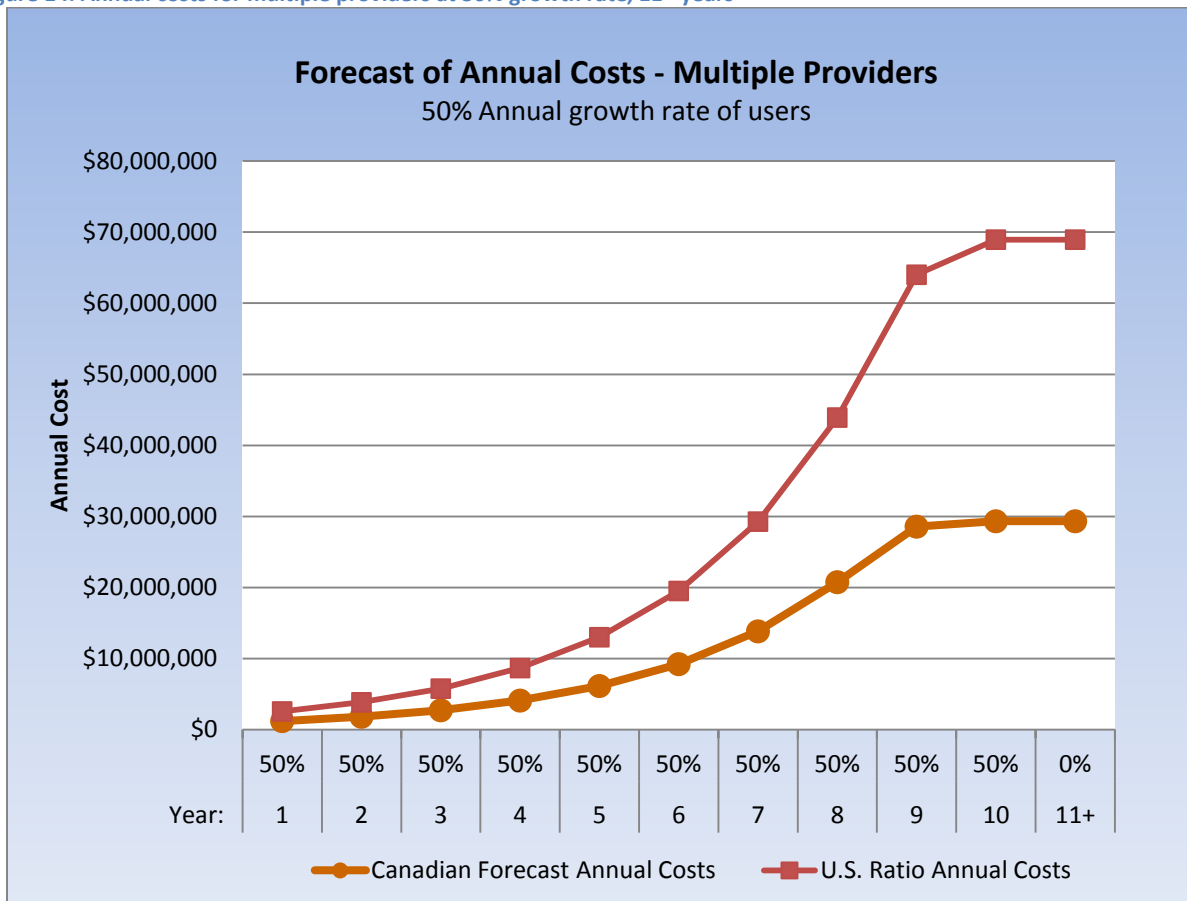
Provider	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
Multiple provider estimates:	17,050	10,826,750	\$68,953,094	\$6.37
Two provider estimates:	17,050	10,826,750	\$61,731,404	\$5.70
Single provider estimates:	17,050	10,826,750	\$58,863,061	\$5.44

Table 32: Canadian Forecast – Comparison of multiple provider costs versus one and two provider costs, at full maturity

Provider	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
Multiple provider estimates:	15,345	6,820,853	\$29,329,666	\$4.30
Two provider estimates:	15,345	6,820,853	\$27,732,442	\$4.07
Single provider estimates:	15,345	6,820,853	\$27,100,282	\$3.97

Applying the initially delayed implementation presented in section 4.3 to the scenario with multiple providers results in the first ten year costs shown below, prior to the full implementation costs depicted above for years eleven and beyond. Two delayed scenarios are presented, a 50% annual growth rate, and a further initially delayed growth that uses the same growth rates presented above in section 4.3.2: 10%, 20%, 30%, 40%, 50%, 60%, 70%, 90%, 100%, 80%, and 0% for years 11 and beyond.

Figure 14: Annual costs for multiple providers at 50% growth rate, 11+ years



In all charts and tables “Year 11” represents fully deployed and subscribed ongoing service costs for year 11 and annually thereafter, while the maximum number of users is reached during year 10 or earlier. ASL and LSQ portions are 77% and 23% respectively.

The above chart is derived from the “Total Annual Cost” column presented in the next two tables.

Table 33: U.S. Ratio – Multiple providers’ combined costs; 50% annual growth rate, 11+ years

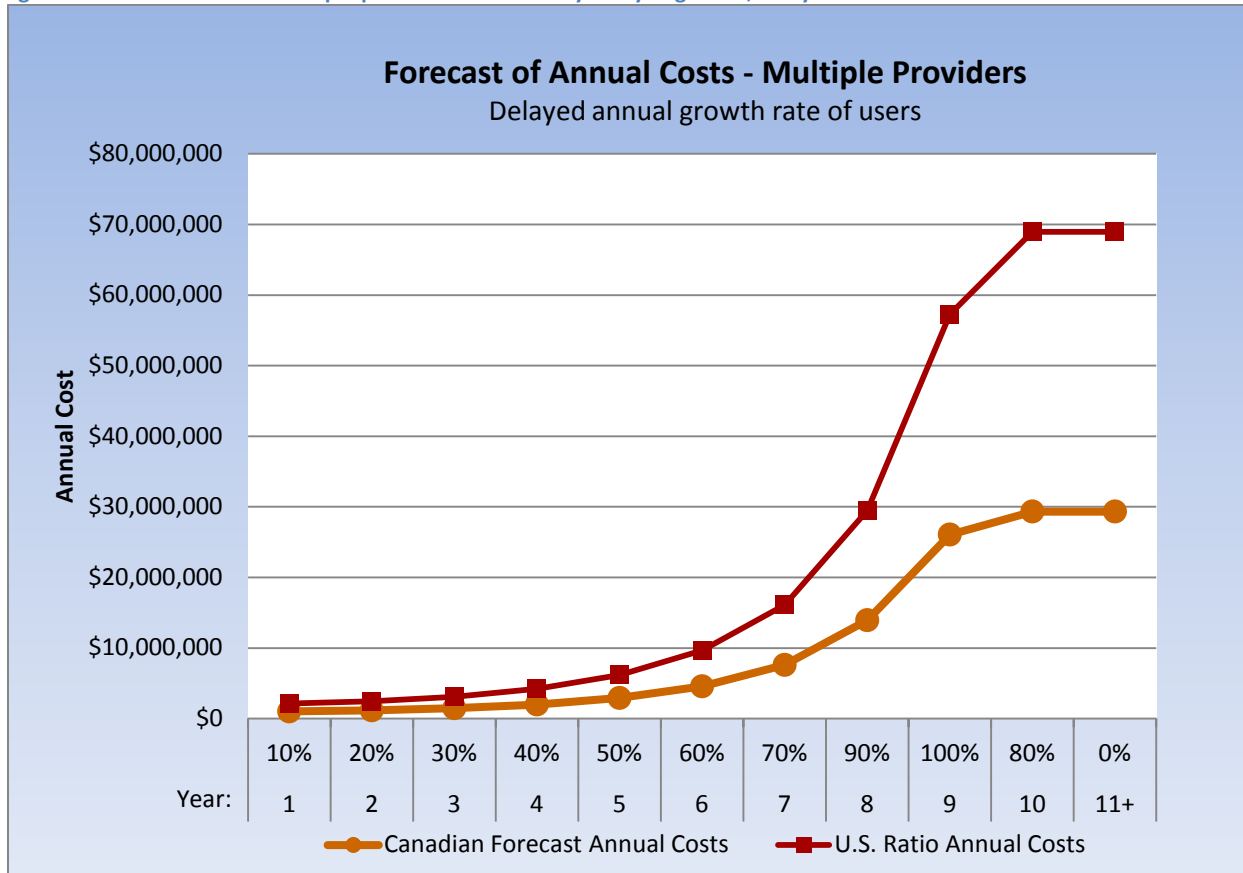
Year	Annual Growth Rate	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
1	50%	750	403,543	\$ 2,570,070	\$6.37
2	50%	1,125	605,314	\$ 3,855,105	\$6.37
3	50%	1,688	907,944	\$ 5,782,489	\$6.37
4	50%	2,532	1,362,181	\$ 8,675,418	\$6.37
5	50%	3,798	2,043,430	\$ 13,014,138	\$6.37
6	50%	5,697	3,064,986	\$ 19,520,196	\$6.37
7	50%	8,546	4,597,400	\$ 29,279,789	\$6.37
8	50%	12,819	6,896,470	\$ 43,922,042	\$6.37
9	50%	17,050	10,050,939	\$ 64,012,129	\$6.37
10	50%	17,050	10,826,750	\$ 68,953,094	\$6.37
11+	0%	17,051	10,826,750	\$ 68,953,094	\$6.37

Table 34: Canadian Forecast – Multiple providers’ combined costs; 50% annual growth rate, 11+ years

Year	Annual Growth Rate	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
1	50%	750	282,480	\$ 1,214,663	\$4.30
2	50%	1,125	423,720	\$ 1,821,994	\$4.30
3	50%	1,688	635,561	\$ 2,732,912	\$4.30
4	50%	2,532	953,527	\$ 4,100,164	\$4.30
5	50%	3,798	1,430,401	\$ 6,150,724	\$4.30
6	50%	5,697	2,145,490	\$ 9,225,609	\$4.30
7	50%	8,546	3,218,180	\$ 13,838,174	\$4.30
8	50%	12,819	4,827,529	\$ 20,758,376	\$4.30
9	50%	15,345	6,644,423	\$ 28,571,019	\$4.30
10	50%	15,345	6,820,853	\$ 29,329,666	\$4.30
11+	0%	15,345	6,820,853	\$ 29,329,666	\$4.30

Applying the delayed annual growth rates of 10%, 20%, 30%, 40%, 50%, 60%, 70%, 90%, 100%, 80%, and 0% for years 11 and beyond to two VRS providers (ASL and LSQ) results in the following costs per year:

Figure 15: Annual costs for multiple providers with initially delayed growth, 11+ years



The above chart is derived from the “Total Annual Cost” column presented in the next two tables.

Table 35: U.S. Ratio – Multiple providers’ combined costs; initially delayed growth rate, 11+ years

Year	Annual Growth Rate	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
1	10%	550	334,751	\$ 2,131,951	\$6.37
2	20%	660	387,138	\$ 2,465,595	\$6.37
3	30%	858	487,363	\$ 3,103,900	\$6.37
4	40%	1,201	662,887	\$ 4,221,776	\$6.37
5	50%	1,802	969,063	\$ 6,171,740	\$6.37
6	60%	2,883	1,516,168	\$ 9,656,129	\$6.37
7	70%	4,901	2,524,866	\$ 16,080,293	\$6.37
8	90%	9,312	4,629,309	\$ 29,483,008	\$6.37
9	100%	17,050	8,989,378	\$ 57,251,289	\$6.37
10	80%	17,050	10,826,750	\$ 68,953,094	\$6.37
11+	0%	17,050	10,826,750	\$ 68,953,094	\$6.37

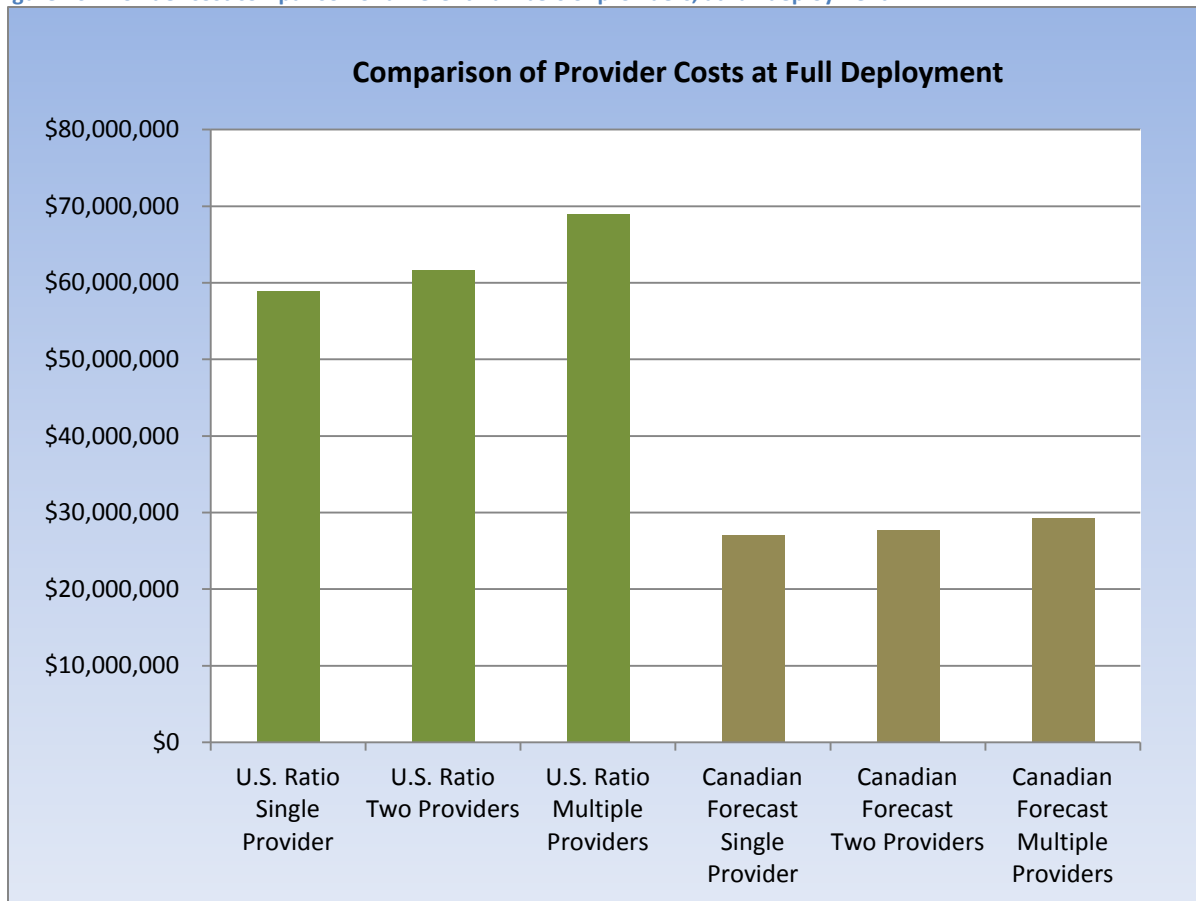
Table 36: Canadian Forecast – Multiple providers’ combined costs; initially delayed growth rate, 11+ years

Year	Annual Growth Rate	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
1	10%	550	234,326	\$ 1,007,600	\$4.30
2	20%	660	270,997	\$ 1,165,286	\$4.30
3	30%	858	341,154	\$ 1,466,961	\$4.30
4	40%	1,201	464,021	\$ 1,995,290	\$4.30
5	50%	1,802	678,344	\$ 2,916,879	\$4.30
6	60%	2,883	1,061,318	\$ 4,563,667	\$4.30
7	70%	4,901	1,767,406	\$ 7,599,846	\$4.30
8	90%	9,312	3,240,516	\$ 13,934,219	\$4.30
9	100%	15,345	6,061,387	\$ 26,063,965	\$4.30
10	80%	15,345	6,820,853	\$ 29,329,666	\$4.30
11+	0%	15,345	6,820,853	\$ 29,329,666	\$4.30

4.4.4. Cost comparisons of one, two and multiple provider solutions

A comparison of the costs of a single-provider, two-provider, and multiple provider VRS at full maturity and for delayed implementations are shown below.

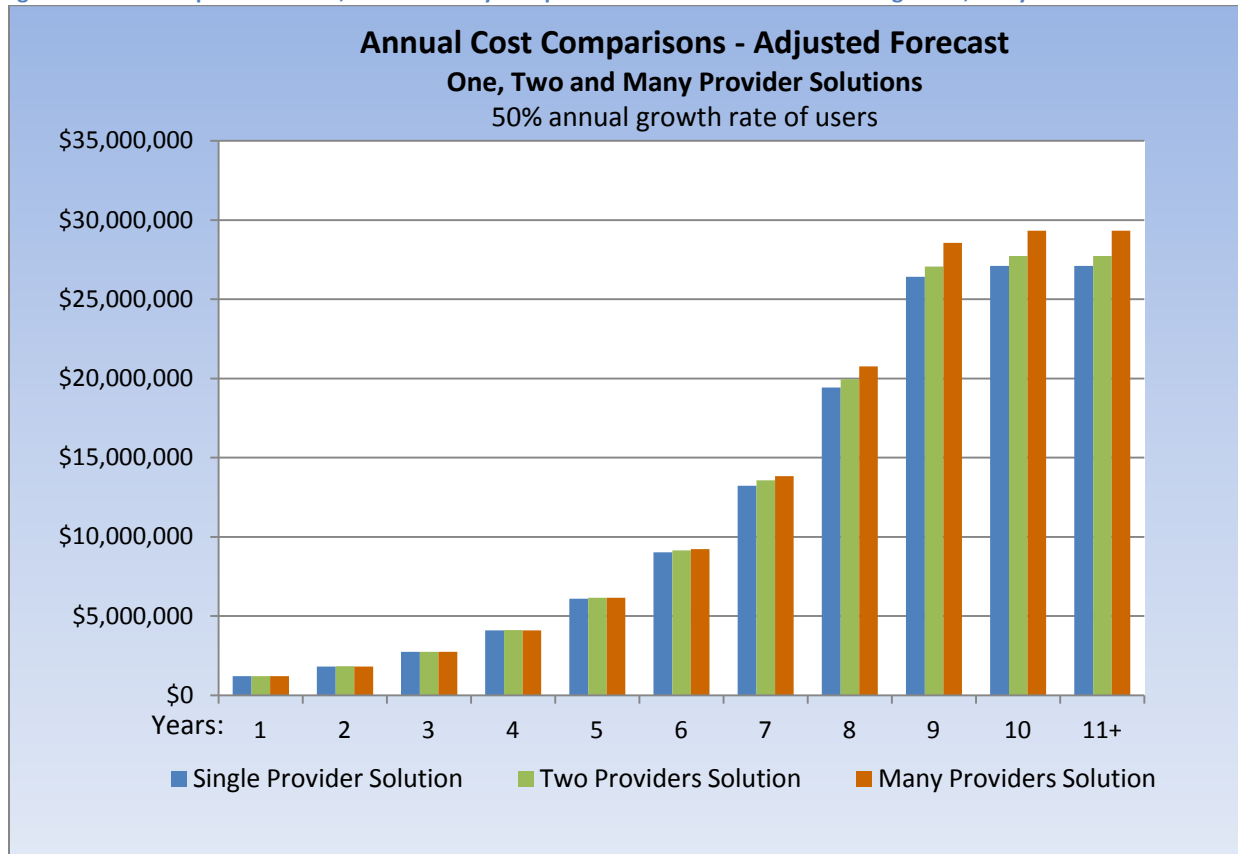
Figure 16: Provider cost comparison of different numbers of providers, at full deployment



The above chart is derived from the total costs shown in Table 31 and Table 32. It is significant to note that there is very little difference in costs between one, two or many providers for a fully deployed 24x7 service, with 100% of anticipated users, for the Canadian Forecast – which represents the probable Canadian VRS provider costs.

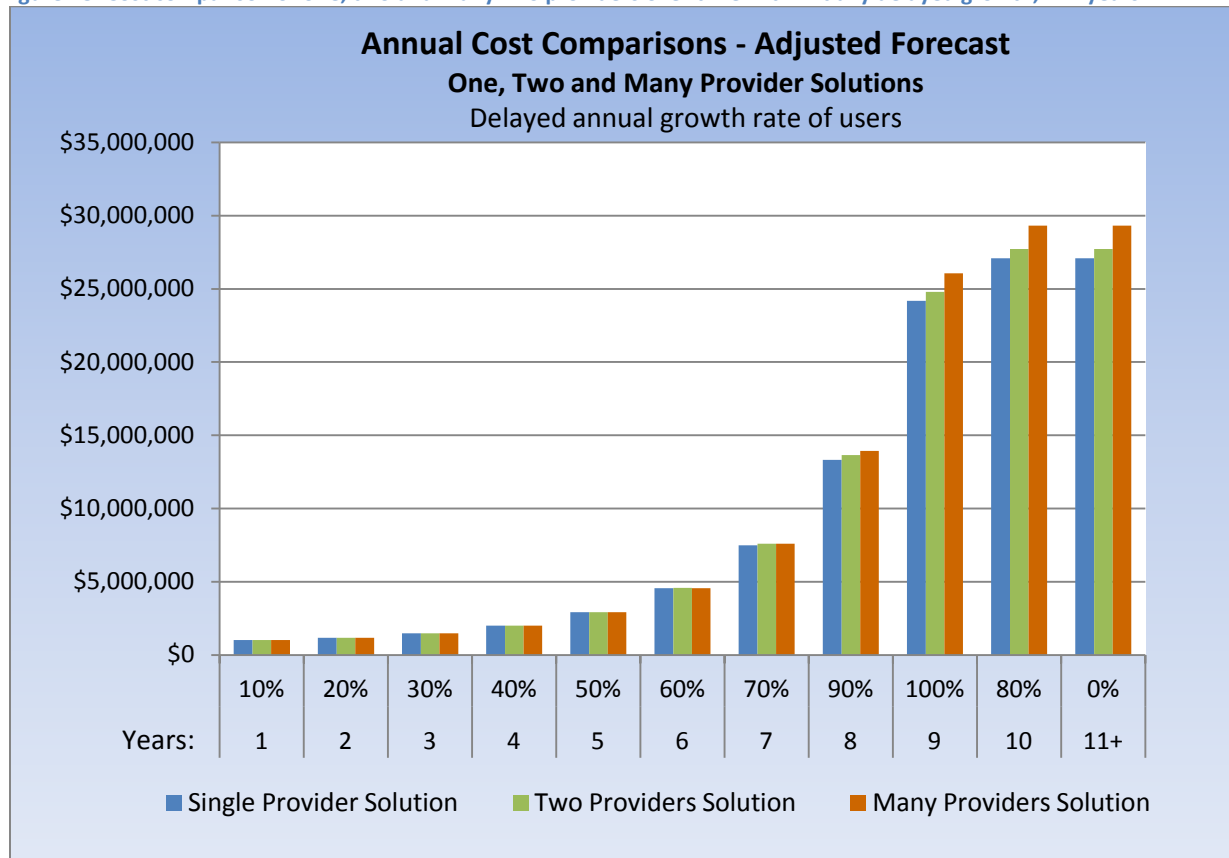
The Canadian Forecast VRS provider costs over time shown in Figure 17 below represent the 50% annual growth rates of Table 22, Table 28, and Table 34.

Figure 17: Cost comparison of one, two and many VRS providers over time at 50% annual growth, 11+ years



The Canadian Forecast VRS provider costs over time shown in Figure 18 below represent the initially delayed growth rate of Table 24, Table 30, and Table 36.

Figure 18: Cost comparison of one, two and many VRS providers over time with initially delayed growth, 11+ years

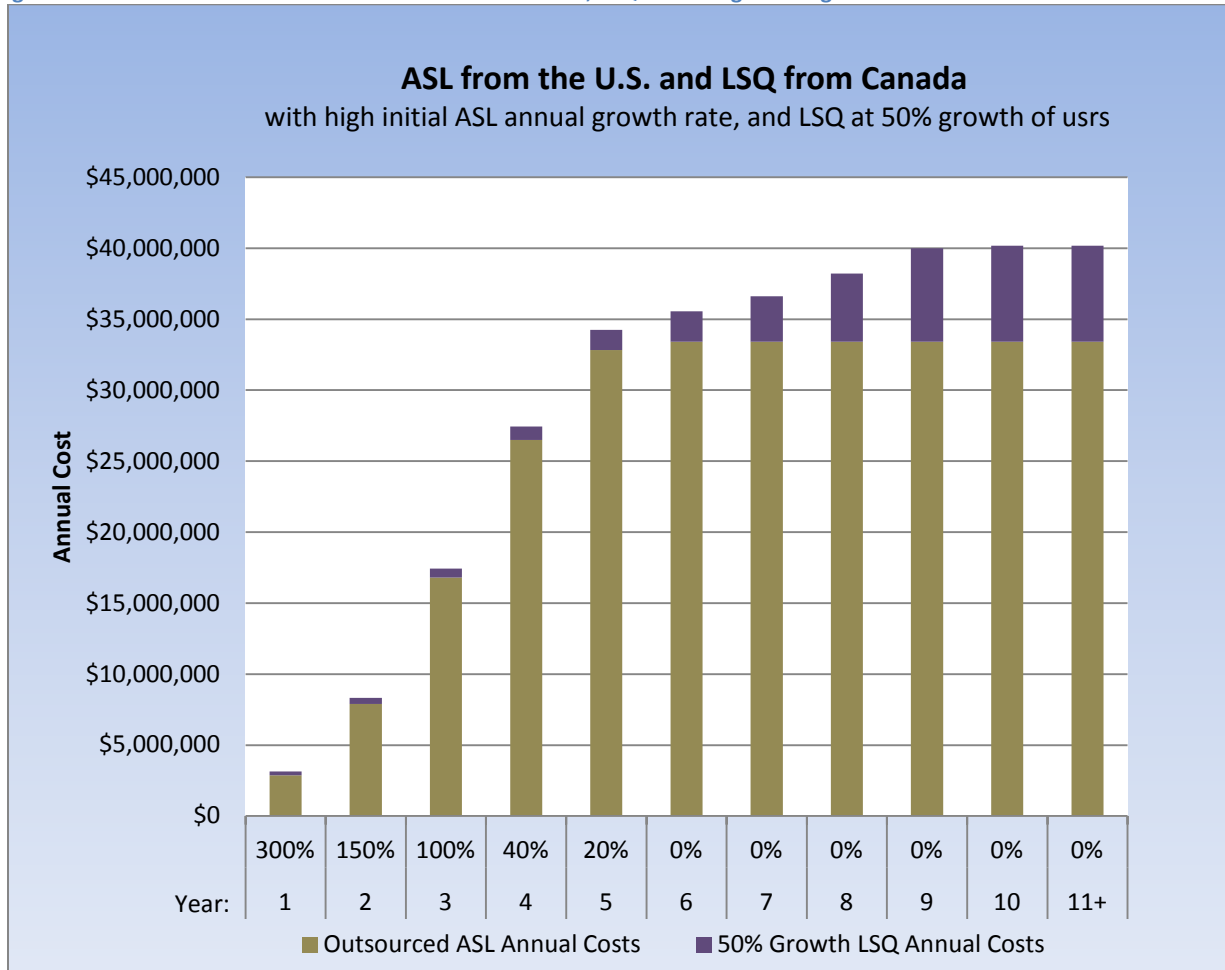


4.5. The Potential to Outsource VRS

Dividing VRS into two separate services, an ASL VRS provider and a LSQ VRS provider, creates an opportunity to outsource the ASL VRS to the U.S.. In the U.S. there are many available qualified ASL interpreters, and the U.S. VRS providers should be able to easily accommodate the slight increase in traffic that Canadian ASL will represent.

If Canadian ASL VRS were outsourced to the U.S., the primary factor limiting ASL growth or adoption, the shortage of interpreters, would be removed. In this case a more aggressive adoption rate for ASL VRS would be expected, particularly in response to the pent up demand from Canadians who are Deaf and have been waiting for a long time for VRS. A suggested resulting ASL VRS adoption shown over eleven years is provided below in Figure 19, along with associated costs. Because the ASL traffic will be handled in the U.S., for this forecast the ASL costs are derived from the Canadian Forecast minutes but using the U.S. tier thresholds and U.S. per minute rates (in Canadian dollars), and with a single ASL provider (representing the lowest possible U.S. ASL costs). The LSQ VRS traffic, however, cannot be outsourced because there is no existing VRS anywhere in the world that supports LSQ (LSQ interpreters and LSQ interpreter training are only in Canada). Therefore the LSQ costs are forecast using the Canadian Forecast minutes of use at 50% annual growth with multiple LSQ VRS providers, and using the Canadian Forecast tiers and per minute rates. Note that this outsourced solution is significantly more expensive than any Canadian Forecast scenario (one, two, or many providers).

Figure 19: ASL outsourced to the United States at U.S. rates; LSQ remaining at 50% growth



The above chart is derived from the “Total Annual Cost” columns presented in the following two tables.

Table 37: ASL only; outsourced to a single provider the U.S. (in CAD), 11+ years

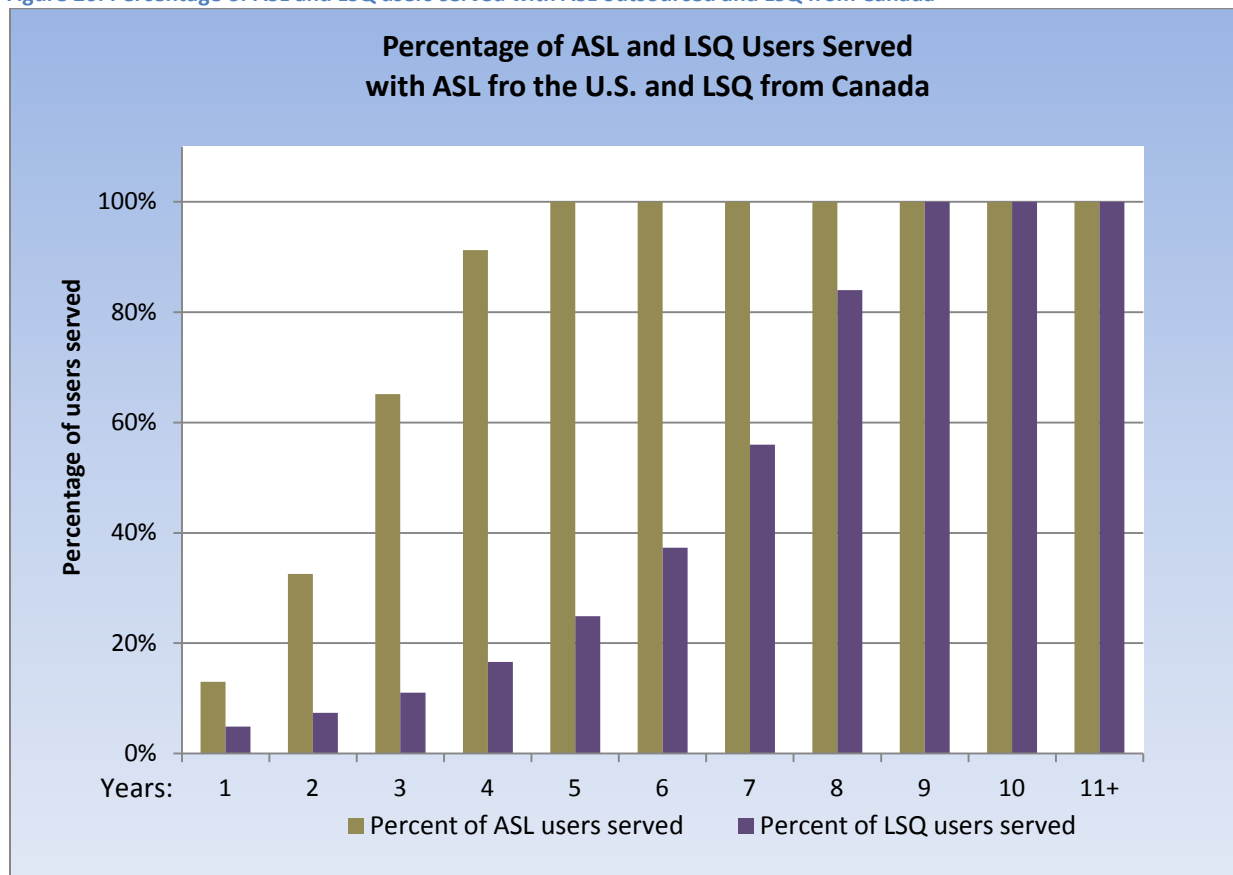
Year	Annual Growth Rate	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
1	300%	1,540	449,278	\$ 2,861,292	\$6.37
2	150%	3,850	1,240,822	\$ 7,898,912	\$6.37
3	100%	7,700	2,638,330	\$ 16,791,475	\$6.36
4	40%	10,780	4,164,224	\$ 26,500,980	\$6.36
5	20%	11,816	5,160,163	\$ 32,838,298	\$6.36
6	0%	11,816	5,252,212	\$ 33,424,017	\$6.36
7	0%	11,816	5,252,212	\$ 33,424,017	\$6.36
8	0%	11,816	5,252,212	\$ 33,424,017	\$6.36
9	0%	11,816	5,252,212	\$ 33,424,017	\$6.36
10	0%	11,816	5,252,212	\$ 33,424,017	\$6.36
11+	0%	11,816	5,252,212	\$ 33,424,017	\$6.36

Table 38: LSQ only; from multiple providers in Canada (in CAD), 11+ years

Year	Annual Growth Rate	Number of VRS Users	Total Annual Minutes of Use	Total Annual Cost	Average Cost Per Minute
1	50%	173	65,008	\$ 279,535	\$4.30
2	50%	260	97,716	\$ 420,178	\$4.30
3	50%	390	146,907	\$ 631,701	\$4.30
4	50%	585	220,361	\$ 947,552	\$4.30
5	50%	878	330,486	\$ 1,421,089	\$4.30
6	50%	1,317	495,988	\$ 2,132,748	\$4.30
7	50%	1,976	744,019	\$ 3,199,281	\$4.30
8	50%	2,964	1,116,214	\$ 4,799,718	\$4.30
9	50%	3,529	1,530,710	\$ 6,582,052	\$4.30
10	50%	3,529	1,568,641	\$ 6,745,154	\$4.30
11+	0%	3,529	1,568,641	\$ 6,745,154	\$4.30

The outsourced ASL scenario would allow Canadian ASL users to achieve maximum use of VRS earlier than would be achieved by Canadian LSQ users, thereby creating significant initial disparity of the percentage of potential users served, as illustrated in the following chart.

Figure 20: Percentage of ASL and LSQ users served with ASL outsourced and LSQ from Canada



4.6. The Effect of Limiting Available VRS Hours

All countries that provide VRS, except the United States, limit consumer or business access to the service by time of day and sometimes by day of the week. Restricted access is usually due to lack of funding for 24 hour service, including cost considerations for significantly higher operational expenses per minute of usage during the non-busy evening and weekend times.

In this study's phase 9, *Forecasts of User Demand*, the analysis of U.S. traffic by time-of-day and day-of-the-week indicated that the great majority of VRS usage occurs between 8 AM and 8 PM, Monday through Friday. Usage forecasts in phase 9 for a Canadian VRS limited to these time periods (at the local time in each time zone) suggest that minutes of use for this time period may be approximated at 83% of a 24 hour a day, 365 day a year service.⁶⁰ The reduced minutes at 83% usage, and corresponding reduced costs, at service maturity (15,345 consumers) using the Canadian Forecast data are shown in the following table:

Table 39: Canadian Forecast – Costs at maturity, 15,345 users, with restricted hours

	Total Annual Minutes of Use	Average Minutes per User Annually	Average Minutes per User Monthly	Total Annual Cost	Average Cost per Minute
One provider:	5,661,308	369	30.7	\$22,636,034	\$4.00
Two providers:	5,661,308	369	30.7	\$23,201,527	\$4.10
Many providers:	5,661,308	369	30.7	\$24,343,624	\$4.30

Restricted hours could be combined with other restrictions, such as further actively restricting the minutes of use per consumer to further decrease costs, both initially as well as permanently. However such additional restrictions would likely be considered by many consumers to be unjustifiable.

4.7. The Cost Impact of Including Video Remote Interpreting

Video Remote Interpreting (VRI) is a service in which a remote interpreter is used to provide interpreting services between two or more individuals who are together in the same room or venue. VRI is generally not considered a form of telecommunications or message relay service, and is usually not included within countries' VRS programs.⁶¹ VRI is probably outside of the jurisdiction of the CRTC to order, and would likely be opposed by TSPs who would otherwise be required to fund it as MRS. The effect of including VRI within VRS upon community interpreting and other considerations is discussed in this study's phase 8, *Potential Related Services*.

Nevertheless, if VRI is approved for reimbursement from VRS funds, the total number of VRS/VRI minutes of use will increase because of the convenience of VRI. Furthermore, unlike relatively brief VRS

⁶⁰ See this study's phase 9 for more information on typical call distribution by time-of-day and day-of-the-week. To invoke time-of-day restriction in the consumer's time zone will require user registration.

⁶¹ As VRI is not considered a telecommunications relay transaction, this service is not approved for reimbursement by the FCC in the U.S.

calls from users, VRI sessions may be lengthy and used by businesses to more fully engage Deaf consumers (such as participating in a business meeting). Very little usage data on VRS from other countries has been successfully acquired for this study. However if VRI were reimbursed at the same rates as standard VRS, additional costs for a fully operational unrestricted VRS (24 x 7, 15,345 consumers) at the Canadian Forecast levels can be projected for VRI minutes of use as an additional percentage of the 6,820,853 standard VRS minutes:

Table 40: Canadian Forecast – Cost projections for VRI usage, with fully deployed VRS

Number of VRS Providers	VRI as a Percent of VRS traffic	Annual VRI Minutes	Annual Cost of VRI	Annual Cost of VRI+VRS	Average Cost Per Minute
One provider:	10%	682,085	\$2,626,028	\$29,726,310	\$3.96
One provider:	20%	1,364,171	\$5,252,057	\$32,352,339	\$3.95
One provider:	30%	2,046,256	\$7,878,085	\$34,978,367	\$3.94
One provider:	40%	2,728,341	\$10,504,113	\$37,604,395	\$3.94
Two providers:	10%	682,085	\$2,662,244	\$30,394,686	\$4.05
Two providers:	20%	1,364,171	\$5,330,489	\$33,062,931	\$4.04
Two providers:	30%	2,046,256	\$7,995,733	\$35,728,175	\$4.03
Two providers:	40%	2,728,341	\$10,660,977	\$38,393,419	\$4.02
Many providers:	10%	682,085	\$2,932,966	\$32,262,632	\$4.30
Many providers:	20%	1,364,171	\$5,865,933	\$35,195,599	\$4.30
Many providers:	30%	2,046,256	\$8,798,899	\$38,128,565	\$4.30
Many providers:	40%	2,728,341	\$11,731,866	\$41,061,532	\$4.30

Because of the lack of VRI usage data, the cost implications of VRI would best be identified in a VRI trial.

5. Additional Cost Considerations

In addition to the direct VRS program costs and their variables discussed above in section 4, there are other areas of consideration that may impact overall program costs. These areas should be considered because, by policy or process, they may impact the overall VRS program or they may become a direct cost responsibility of the program. Five significant areas of consideration are presented below:

- VRS fraud
- Public education and outreach
- MRS cost offsets
- Third party administrative costs, including VRS platform and database
- Consumer VRS costs
- VRS model cost considerations

5.1. Fraudulent VRS Costs

Fraud or misuse of VRS can affect the availability of network and interpreter resources, as well as result in lost funds for the VRS program. The United States VRS environment has had a high incidence of fraudulent call volumes and costs. Other countries have not reported any VRS fraud or misuse.

VRS fraud perpetrated by VRS providers in the U.S. has been in two areas: 1) billing for improper types of calls, and 2) inflating the declaration of expenses on which reimbursement rates are set, and including expenses that should not be reimbursable.

The first type of fraud results in increased billed and reported minutes of use. The FCC and the U.S. Department of Justice (DOJ) has addressed this first type of fraud by clarifying its rules, conducting investigations and arrests, and levying significant penalties. See this study's phase 4, VRS Models in Other Countries, for more information about the unique situation in the U.S. The FCC and DOJ actions have resulted in high profile and awareness of these crimes. Although much of this type of fraudulent calling activity has been reduced, FCC staff indicates that there may still be significant fraudulent call activity.⁶² However, the decline in U.S. VRS call minutes in the last couple of years is assumed to be due to the decline in fraudulent call activity on the part of the U.S. VRS providers. Therefore, in this study's phase 9 and phase 10 analyses, the application of U.S. estimates of minutes of use and minutes per consumer in the U.S. Ratio figures used on behalf of Canada have used the U.S. annual minutes of use data after the decline.

The second type of fraud has not been verified but has been reported.⁶³ This is the inflation of expense reporting, the inclusion of ineligible expenses, and the inflation of projections of future costs within the U.S. providers' cost submissions to the FCC.⁶⁴ Because the U.S. providers' cost accounting records are largely unauditiable, and because the providers submit their own cost estimates, it is very easy to knowingly submit false costs. Since U.S. VRS rates are based on "cost plus" formula of past and future costs, this causes the FCC to inadvertently calculate rates at a significantly inflated rate.

Canada can protect itself against VRS provider fraud by:

- 1) Establishing clear rules regarding what types of calls will be reimbursed and what types will not be reimbursed.
- 2) Not adopting a "cost plus" rate setting methodology.
- 3) Ensuring that the profits from VRS are not excessive, and therefore do not make the risk of abuse or fraud attractive.
- 4) Ensuring that the regulatory and administrative agencies have the authority and means to conduct effective audits appropriate to the rate basis employed.

⁶² See <http://fjallfoss.fcc.gov/ecfs/document/view?id=7021739255>.

⁶³ See section 3.2.2, *Excessive expenses reported in U.S. costs*.

⁶⁴ Also see section 3.2.1, *Incongruities of U.S. rate averaging*.

- 5) Establishing and enforcing accountability, including significant penalties for fraud and abuse.

However, even if it were possible to accurately identify the percentage of the U.S. rates that are over inflated due to fraud, that does not mean that Canada will be able to acquire its own rates without the influence of the existing U.S. rates. As long as the FCC continues to offer very high reimbursement rates, U.S. vendors who may wish to bid Canadian VRS may or may not be willing to reduce their rates for a Canadian bid. Even if U.S. or Canadian firms bid significantly lower rates, they will have to compete for available interpreters with U.S. VRS firms operating in Canada that are being reimbursed by the U.S. at higher rates. Likewise, local future Canadian VRS providers may put emphasis on providing ASL VRS on behalf of U.S. consumers if the U.S. reimbursement rates remain high. However, the FCC has indicated that it intends to significantly reduce VRS reimbursement costs, and these issues may become moot by the time Canada establishes its actual VRS rates and begins offering VRS.⁶⁵

5.2. Public Education and Outreach

The likelihood of a successful VRS program introduction will be significantly improved if efforts are made to provide public education, marketing, and outreach to the targeted users, as well as the general population about relay and how to use the services.

In the United States much of the marketing and outreach is generated by the relay service providers as they try to differentiate themselves from other providers, and vie for customers (almost exclusively ASL users). Much of their marketing leverages the Internet to target the specific demographics that would utilize the service. VRS providers in the United States are also very active in the user association gatherings (e.g. Deaf Expo, Deaf Awareness Day Events, etc.). They will usually attend an event by participating in presentations, hosting a booth, and often have terminals where the public can make “test calls” through their VRS call center. In other instances they may supply a group of volunteer interpreters to support the event, providing an example of their services and dedication to the community, while helping offset some of the event promoter’s logistical costs. Almost all U.S. VRS provider marketing is oriented to the potential sign language user; with almost no marketing to the hearing population.

The FCC has stated that relay providers must conduct outreach activities to ensure that “callers in their service area are aware of the availability and use of all forms of TRS.”⁶⁶ As such, they are also including outreach expenses in provider cost submissions that are reimbursable from the TRS Fund.

Unfortunately, the definitions put forth in the TRS Fund Administrator forms and instructions are

⁶⁵ Section 16, Implementation, of this study’s phase 11, Potential Canadian VRS Models, recommends an initial three-year research phase before competitively bidding VRS. This initial low traffic volume period will provide time for the U.S. to reduce its rates prior to completely relying upon market rates for a more fully deployed VRS.

⁶⁶ Federal Communications Commission (FCC); Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities, CG Docket No. 03-123, Cost Recovery Order at ¶ 47.

general and vague, leaving much room for interpretation. This confusion also causes a wide range of costs between the providers. The current definitions from the latest FCC fund payment formula state:

- **Marketing Expense:** “The projected costs of advertising the provider’s service”
- **Outreach Expense:** “The projected costs of notifying consumers of service availability”⁶⁷

The FCC stated that the aggregated marketing and outreach costs that were reported by the VRS providers in 2008 amounted to \$30 million USD. This was an increase from the \$20 million USD reportedly spent the previous year.⁶⁸ For purposes of comparison, the increase in provider reported costs spent on outreach and marketing in 2008 was 4.7% of the Total Fund requirement; a 30 percent increase over the 2007 cost of 3.6%.

Table 41 below represents the cost of outreach and marketing reported by the U.S. VRS providers compared to the reported per/minute costs. It shows the cost contribution for outreach and marketing over the years to be between 6% and 10% of per/minute provider reported costs:

Table 41: VRS provider cost of outreach and marketing, U.S. (USD)⁶⁹

	2007 (actual)	2008 (actual)	2009 (actual)	2010 (projected)	2011 (projected)
Marketing Expense/min	\$0.0639	\$0.0283	\$0.0302	\$0.0415	\$0.0426
Outreach Expense/min	\$0.2321	\$0.3122	\$0.3662	\$0.3317	\$0.3383
M. & O. cost/minute	\$0.2950	\$0.3305	\$0.3964	\$0.3732	\$0.3709
Total Cost per Minute	\$3.9604	\$4.1180	\$4.1596	\$5.2826	\$5.9179
M. & O. as % of Total	7.4487%	8.0257%	9.5298%	7.0647%	6.2674%

As with other provider generated self-reporting of “actual” expenses, there is a degree of uncertainty about the accuracy and effectiveness of these charges. (See also the table and charts in Section 3.1 – *Vendor VRS Rates* regarding the various categories of expense average.) Also, in providers’ promotional efforts and materials there is usually a self-serving purpose and focus between their *marketing and outreach* campaigns, versus the need to inform consumers in more neutral public *outreach and education* efforts, especially with respect to the hearing public.

In the United States, the individual states are directly responsible for the intrastate and non-IP relay services. Many states have an active effort to perform *outreach and education* related to their relay services. Often these expenses are applied to both the state’s relay program and its equipment distribution program. Although the states may not be responsible for the IP-based relay, including VRS,

⁶⁷ Federal Communications Commission (FCC); Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate; Interstate Telecommunications Relay Services (TRS) Fund For July 2010 through June 2011; CC Docket 03-123; CG Docket No. 10-51; April 30, 2010

⁶⁸ Ibid

⁶⁹ Ibid

they usually do help promote the VRS services for their MRS contractors. All outreach and education expenses paid by the individual states are not included in the Interstate TRS cost filings, detailed above.

If, in the selected Canadian model, the contracted VRS providers are not responsible for marketing and outreach, the expenses may arguably be removed from the U.S. Ratio per minute rates used for cost forecasting. In that instance, those costs, currently in the U.S. Ratio forecasted per minute provider rates, may be spent by the CRTC directly, or through its VRS administrator for public education and outreach. Thus these cost elements should not be eliminated but should be shifted to a different, non-VRS vendor, program cost. For the considerations of the various marketing and outreach options and recommendations for Canadian VRS, see section 12 of this study's phase 11, *Potential Canadian VRS Models*.

5.3. MRS Cost Offsets Resulting From VRS Usage

In this study's phase 9, *Forecasts of VRS User Demand*, the growth and impact of U.S. VRS usage on the volume of traditional text relay, IP relay, and potentially other forms of relay was presented. That report's data related to federally funded relay programs and did not include an analysis of the intrastate traditional relay traffic paid by the individual states. While those charts did not fully represent the decline in total *minutes-of-use* nationally, it did provide a percentage of TTY MRS decline which may be applied to the Canadian forecasts.

During the decline of TTY MRS usage in the U.S., several relay technologies were introduced. However, as both IP-relay and VRS had been introduced as a competitor of TTY MRS, it is difficult to attribute the initial decline in U.S. TTY MRS use to VRS or IP-Relay exclusively. The decline in U.S. TTY MRS may also be due in large part to the simultaneous increase of availability of text-to-text communication (e.g., email and SMS) between Deaf, hard of hearing, and hearing users.

The later introduction of captioned telephone service after September 2008 is easier to correlate to the decline in U.S. TTY MRS since by that date VRS and IP-relay growth had begun to stabilize, or subside.

In the U.S. the total TTY relay traffic declined from 2002 to 2011 by 83 percent due to the combined adoption of IP-relay, VRS, captioned telephone relay; and other non-relay forms of communication between Deaf and hearing people (email, texting, etcetera.)

The accelerated growth of VRS traffic in the United States lasted for approximately six years until the market reached maturity. Other data presented in the phase 9 report confirmed that in the three year period from 2008 to 2011 TTY relay traffic was reduced by 46%, as VRS was still growing, IP-relay had peaked, and captioned telephone service growth began its impact on TTY relay.⁷⁰

⁷⁰ NECA TRS Fund Interstate TRS minutes 2010

However in Canada, TTY-Relay has already been declining at a rate of approximately 10 to 11 percent annually⁷¹ as a result of the prevalence among Deaf, deaf, hard of hearing, and hearing users of alternative and ubiquitous means of text communication, such as email, Internet chat, Facebook, texting (SMS), etcetera. Although Canadian IP-Relay has recently been initiated, it has not realized any significant growth, and therefore is considered to not yet have had any significant impact on the reduction of TTY-Relay use.

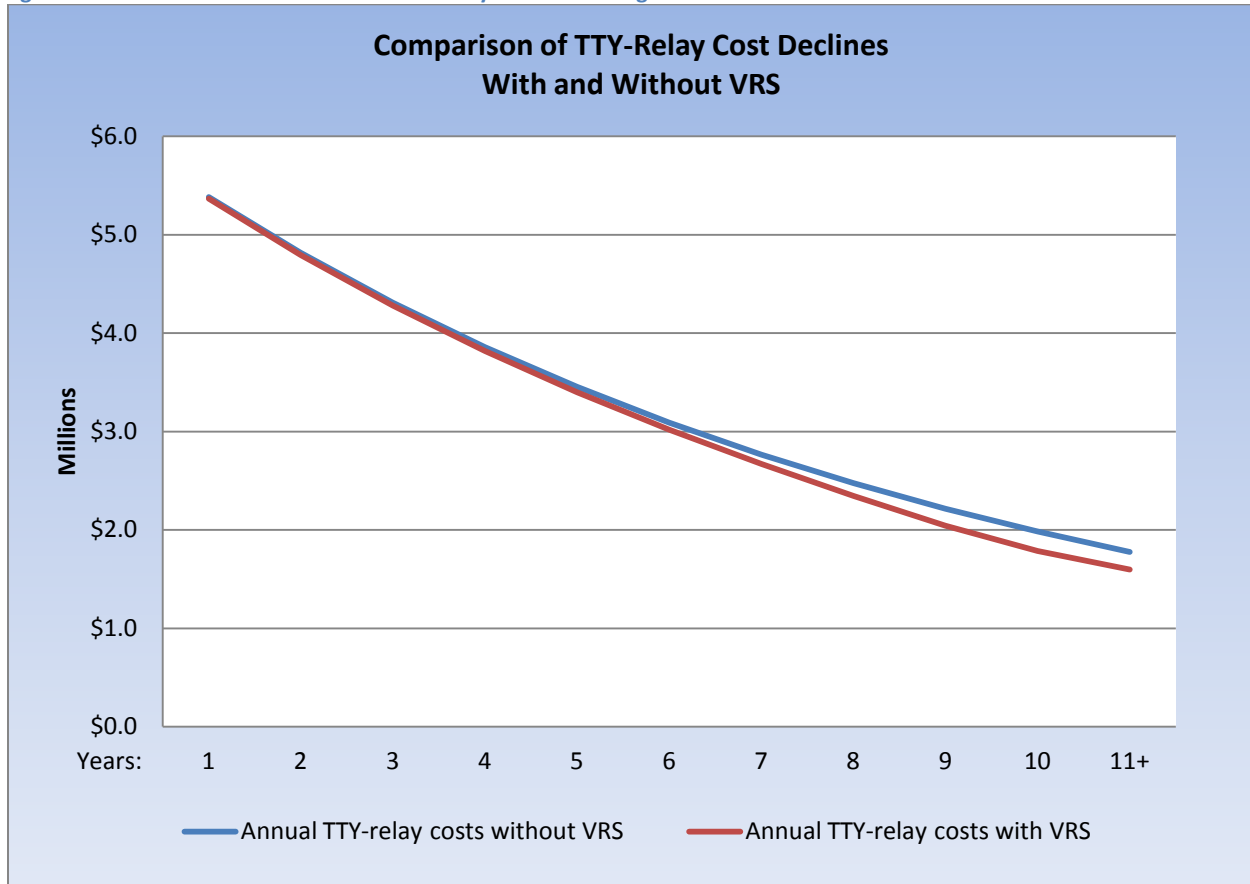
Since VRS offers more natural and fluid conversation in the language of the sign user, it is expected to replace TTY-Relay for people who sign. It is not known what percentage of TTY-Relay calls are presently made by ASL and LSQ users, but their population is usually considered to be about one-tenth of the non-signing combined deaf and hard of hearing populations.⁷² Therefore, the impact of VRS on the reduction of TTY-Relay beyond what is already being experienced due to the availability of modern text communications can be forecast to be very slight. In this context, the experience of the U.S. portrayed above may appear to have a similar decline of TTY-Relay use, but unlike the U.S. the timing and the resulting effect of the availability and adoption of VRS is not expected to have a significant effect upon the decline of TTY-Relay. This is especially true if VRS is only slowly adopted over an eleven year period as suggested in this study's VRS usage and cost analysis.⁷³ Assuming VRS deployment begins in 2013 with a 50% annual adoption rate, a general graphic representation of the decline in TTY-relay costs with VRS and without VRS is shown below. This representation should not be considered an accurate forecast.

⁷¹ Personal communication with Bell Canada.

⁷² See this study's phase 3, *Consumer Interests and Perspectives*

⁷³ This study's phase 9 and 10 deliverables.

Figure 21: Forecast decline in Canadian TTY-relay traffic resulting from VRS



5.4. Third Party Administrative Costs

5.4.1. U.S. Administrative Costs

Although the initial VRS Feasibility Study project phase 1, *Confirmation Report*, states that regulatory administrative costs (e.g. CRTC and telephone company administration expenses) would not be estimated as part of this study, it may be useful to consider some potential cost implications for third party administration, should that be a consideration for Canadian VRS. Once again, the United States may be used for comparison as they have published data on this subject.

While the FCC is involved in many of the regulations and orders dictating the provision of relay services, some of the administration activities for VRS and other relay services are supported by the TRS Fund Administrative Contractor.⁷⁴ As the TRS Fund administrator, their expenses are charged directly to the

⁷⁴ Formerly the National Exchange Carriers Association (NECA); currently Rolka Loubé Salzer Associates, LLC.

TRS Fund. Their annual expenditures for administrative expenses related to relay services are in the range of 0.17% (or rounded up to 2/10ths of 1%) of the Total TRS Fund annual requirements.

*"NECA administrative expenses charged to the TRS Fund are allocated in accordance with NECA's Cost Accounting and Procedures Manual ("CAM") filed with and approved by the FCC annually. NECA annually submits a Statement of Cost Allocation System Compliance to the FCC for which a schedule of costs incurred by category (including the TRS Fund) is attached. Costs for NECA personnel specifically assigned to the TRS Fund such as salaries, benefits and travel are directly charged to the TRS Fund. Common costs are accumulated in defined cost pools and allocated on a monthly basis to the TRS Fund using activity based cost drivers as further described in NECA's CAM. These costs include legal, auditing, finance, information systems, facilities and general overheads."*⁷⁵

These U.S. administrative costs are not identified by and assigned to the various relay services being managed. Also, the administrative costs for intrastate non-IP relay services are the responsibility of the individual states, which have varying degrees of administrative involvement and costs. Nevertheless, as a program administrator may be a consideration in Canada, the U.S. federal TRS Fund administrator data is being provided for reference only (not as a forecast for Canada). For example, the following chart states the NECA administrative expenses for years ended 2009 and 2008:⁷⁶

Table 42: TRS Fund third party administrative costs, U.S. (USD)

	2009	2008
Direct labor	437,000	307,000
NECA allocated common costs	752,000	588,000
Miscellaneous	103,000	87,000
Consultants	42,000	42,000
Data collection agent	51,000	68,000
Travel	5,000	5,000
Total Administrative Costs	\$ 1,390,000	\$ 1,097,000

⁷⁵ NECA; Interstate Telecommunications Relay Services Fund; Notes to Financial Statements; September 30, 2009 and 2008 (in thousands); Withum, Smith + Brown; *Report on Internal Control Over Financial Reporting and on Compliance and Other Matters Based on Audit of Financial Statements Performed in Accordance with Government Accounting Standards*

⁷⁶ Ibid

5.4.2. Estimated Canadian Administrative Costs

Depending upon the model selected for Canada and the role of a Canadian third party VRS administrator, the above U.S. third party administrative costs will likely not be sufficient for a more engaged management of VRS. For example, the third party administrative role represented in sections 13.2.3 and 13.3 of this study’s phase 11, *Potential Canadian VRS Models*, anticipates a significant administrative and management role for all of VRS in Canada. Representative potential initial and annual reoccurring administrative costs might include:⁷⁷

Table 43: Potential Canadian Third Party Administrator costs

Cost Category	Initial Annual Costs	Ongoing Annual Costs
Board member reimbursements	\$250,000	\$250,000
Staff costs (6 people), loaded	\$640,000	\$640,000
Facilities and furniture	\$350,000	\$200,000
Legal, CPA, interpreters and consultants	\$2,500,000	\$500,000
Operational equipment and services	\$300,000	\$200,000
VRS platform and database costs	\$1,000,000	\$800,000
Network costs	\$50,000	\$50,000
Miscellaneous expenses	\$250,000	\$250,000
Subtotals:	\$5,340,000	\$2,890,000
Less VRS provider charge backs:		
Platform and database	\$0	\$360,000
Network costs	\$0	\$40,000
Totals:	\$5,340,000	\$2,510,000

The above suggested administrator costs are examples only. Note that general VRS education and outreach expenses are not included. Similarly consumers’ VRS costs are not included.

5.4.3. Combined Canadian Administrative and Provider Costs

For reference, combining the suggested Canadian annual administrative costs with the annual Canadian Forecast of VRS provider costs, results in the following estimates of VRS program costs for a fully deployed VRS serving all Canadians who wish to use it (estimated at 15,345 people). Table 44 shows VRS as provided by multiple providers operating 24 x 7 as well as with restricted hours. Note that the table below does not include consumers’ costs or the cost of public education and outreach.

⁷⁷ The cost estimates of Table 43 are suggestions only. While a detailed cost analysis of potential Administrator costs are outside the scope of this study, it is assumed that a cost forecast, even based on estimates, will be useful. Initial annual costs are for the period before relay services actually begin. Ongoing annual costs are after VRS has begun. See phase 12, *Final Report*, section 7.1.1 for a potential one-and-a-half year timeline of initial administrator tasks.

Table 44: Annual VRS provider and administrative costs⁷⁸

Forecast ongoing VRS annual program costs	24 x 7 VRS	Restricted Hours VRS
Annual provider costs:	\$29,329,666	\$24,343,624
Annual administrative costs:	\$2,510,000	\$2,510,000
Total costs:	\$31,839,666	\$26,853,624

As forecast above in Table 44, estimated annual administrative costs represent only eight to nine percent of the total VRS program costs (even less if consumer and education costs are included).

5.5. Consumers' VRS Costs

Potential consumer cost factors are presented in two categories: terminal equipment related costs and network related costs. Consumer terminal equipment considerations include end-point equipment, hardware and software installation, and training. Network costs include broadband access and usage costs.

5.5.1. Terminal equipment considerations

The VRS user can connect to the relay center VI through any of several end-point or terminal devices at the consumer's location:

- a videophone;
- a computer with a web camera running video chat or a proprietary video relay software program (also called a "client") which is downloaded and installed on the end user's computer;
- a computer with web camera running a browser-based chat or video relay software program (i.e. no software installation required on the end-user's computer); or
- a mobile or tablet device with wireless or cellular Internet connectivity.

Examples of these devices, their current applications, and costs are detailed in this study's phase 5 Report, *Technologies and Their Forecasts*.⁷⁹

VRS hardware technologies and software costs vary. Client VRS software, either downloaded on a consumer's existing computer or as a website function, is usually provided by VRS vendors at no charge.

⁷⁸ Annual multiple provider costs for 24 x 7 service are from section 4.4.3, and restricted service costs are from section 4.6.

⁷⁹ VRS Feasibility Study, phase 5, *Technologies and Their Forecasts*; section 6.

When considering a standalone videophone, costs typically vary from a \$150-\$500, and can escalate to more than a thousand dollars for professional (non-consumer) models.

As stated in phase 4 of this study, *VRS Models in Other Countries*, in some countries the VRS consumer equipment costs may be subsidized in whole or in part, either by the VRS vendors to promote business, or by a government agency. However, in most VRS models desktop or laptop computers are not provided to consumers. Similarly, smartphone devices or mobile tablets, and their associated cellular and data service plans, are usually the financial responsibility of the consumer.

In the United States, where a competitive VRS model encourages providers to differentiate themselves, providers have adopted different strategies of technical support to the consumer. While some offer comparatively minimal consumer support, others offer more complete personalized services. These include the delivery of equipment, as well as the set-up and testing by Deaf installers who then explain the equipment and demonstrate its use in sign language. This latter approach was successfully employed by Sorenson during the initial U.S. deployment of VRS and it enabled them to acquire more than 80% of the U.S. VRS market. This is the current deployment process in the current Telus VRS trial.

For this study, there are no estimates of how many potential Canadian VRS consumers lack suitable equipment. Order of magnitude equipment cost forecasts can be made, but without foundation. For example the following table lists potential costs based on an average of \$300 per device being required, by different percentages of the forecast 15,345 eventual VRS users:

Table 45: Estimates of potential VRS program consumer equipment costs

Percent of 15,345 users needing equipment	Number of pieces of equipment needed	Average cost of each unit	Estimated total cost of needed equipment
10%	1,535	\$300	\$460,500
20%	3,069	\$300	\$920,700
30%	4,603	\$300	\$1,380,900

The above table only identifies potential consumer costs of equipment without any sharing or subsidizing of those costs.

The policy questions are: Who will pay for these devices and their technical support: the VRS vendors, the provincial or local government agencies, the VRS program, the consumers themselves, or some combination of these? Should equipment subsidies, if any, be based on disability, personal income, or both?

5.5.2. Broadband access and usage costs

As presented in this study’s phase 5, *Technologies and their Forecast*, an adequately fast broadband requirement is of critical importance to the quality of a VRS experience. Canada has one of the highest levels of availability of fast broadband service among the countries with established VRS.⁸⁰ As reported in this study’s phase 5:

“Approximately 98% of Canadian households are located within a 1.5 Mbps broadband footprint, consisting of either landline or mobile (i.e., HSPA+) facilities. On a provincial basis the footprint encompasses all households in the following 5 provinces: Alberta, Ontario, New Brunswick, Nova Scotia, and Prince Edward Island. For the remaining provinces it encompasses at least 89% of the households. With respect to Canada’s mobile network, 97% of Canadians are within the mobile broadband footprint.”⁸¹

Table 46: 2010 Internet and Broadband Availability at a Glance⁸²

Broadband availability (excluding satellite)	
National	96%
Urban	100%
Rural	85%
National wireless (HSPA+)	98%

As depicted in tables 47 and 48 below, *subscription rates* are however lower than *availability rates*, as shown in both the 2011 CRTC Communications Monitoring Report statistics as well as the 2010 Canadian Internet Use Survey, which reports that 8 out of 10 Canadian households (79%) have subscribed to Internet services.⁸³

Table 47: Broadband penetration rates, 2010

Penetration (actually signed up for service)	
All speeds	77%
High-speed	74%
Broadband (1.5 Mbps and higher)	70%
Broadband (5 Mbps and higher)	52%

⁸⁰ See this study’s phase 4, *VRS Models in Other Countries*, for details.

⁸¹ CRTC 2011 Communications Monitoring Report, Executive Summary, page i; at www.crtc.gc.ca/eng/publications/reports/policymonitoring/2011/cmr2011.pdf (English) or www.crtc.gc.ca/fra/publications/reports/policymonitoring/2011/cmr2011.pdf (French). Also see VRS Feasibility Study phase 5, *Technologies and their Forecast*, sections 4 and 5, Mission Consulting, 2/24/2012.

⁸² CRTC 2011 Communications Monitoring Report, from data on page 137

⁸³ 2010 Canadian Internet use Survey, available at Statistics Canada at <http://www.statcan.gc.ca/daily-quotidien/110525/dq110525b-eng.htm>. This report has additional useful information about subscription rates per household income and other factors.

Table 48: CRTC report of households by province with Internet subscriptions, 2010⁸⁴

Canadian Households with Subscribed Internet Access (2010)	
Canada	79%
<i>Newfoundland and Labrador</i>	74%
<i>Prince Edward Island</i>	73%
<i>Nova Scotia</i>	77%
<i>New Brunswick</i>	70%
<i>Quebec</i>	73%
<i>Ontario</i>	81%
<i>Manitoba</i>	73%
<i>Saskatchewan</i>	76%
<i>Alberta</i>	83%
<i>British Columbia</i>	84%

In 2010 the average monthly fee for broadband services in Canada was \$38.96.⁸⁵ A breakdown of average rates by speed tier is shown below:

Table 49: Average monthly cost per broadband subscriber (2010)⁸⁶

Download Speeds	Average Subscriber Rate
300 to 1,400 Kbps	\$28.87
1.5 to 4 Mbps	\$33.57
5 to 9 Mbps	\$42.23
10 to 15 Mbps	\$39.67
16 to 100 Mbps	\$53.71

For a more detailed breakdown of the above rates by wireline, wireless, broadband, and mobile Internet service plan average monthly prices, see this study's phase 5 report.

Demographics of average subscription rates for Deaf users, however, are not available.⁸⁷ Since no estimates for the Deaf population are available, cost projections can be forecast using a similar methodology to that used for estimating equipment costs:

⁸⁴ 2010 Canadian Internet use Survey, <http://www.statcan.gc.ca/daily-quotidien/110525/dq110525b-eng.htm>

⁸⁵ Ibid, data from table 5.3.3, page 141.

⁸⁶ Ibid, data from 5.3.3, page 141. Excludes terminal rental costs

⁸⁷ Some can be extrapolated from the Bell Consumer statistics, although these surveys only represent current Bell subscribers, and therefore are not an accurate representation of the entire Deaf population.

Table 50: Estimates of potential VRS program consumer broadband costs

Percent of 15,345 users needing broadband	Number of users needing broadband	Average annual cost of broadband⁸⁸	Estimated total annual cost of needed broadband
10%	1,535	\$403	\$618,605
20%	3,069	\$403	\$1,236,807
30%	4,603	\$403	\$1,855,009

The above table only identifies potential consumer costs of equipment without any sharing or subsidizing of those costs.

However the question is the same as that for VRS equipment: To what extent should VRS consumers be subsidized for subscribing to Internet services at speeds necessary for VRS?

The policy questions are the same as that for VRS equipment: Who will pay for the necessary broadband services: the VRS vendors, the provincial or local government agencies, the VRS program, the consumers themselves, or some combination of these? Should broadband subsidies, if any, be based on disability, personal income, or both?

Although these questions for both consumer equipment and consumer broadband service are beyond the scope of this study, they are pertinent policy considerations of VRS program design that may directly impact program costs via equipment and network expenditures or subsidies, or may indirectly affect program costs by influencing the consumers’ VRS adoption rates and minutes of use.

5.6. VRS Model Cost Considerations

There are many considerations in the selection of the VRS model components that may affect total VRS program costs. Some of these choices have been presented in this document for cost forecasting purposes only, such as: using tiered per minute rates that are sensitive to monthly volume of minutes, the method and amount of VRS provider reimbursement, the number of providers, the anticipated population of VRS users, the average minutes of use per person, the anticipated level of VRS interpreter efficiency, the rate of VRS deployment over time (annual growth rates), the potential costs of outsourcing, limiting hours and access, potential VRI costs, administrative costs (including VRS platform and database), and consumer costs.

However, there are additional model choices that can affect costs. These potentially include:

- Establishing VRS provider reimbursement rates based on an offered set rate or via competitive bid. For example, the tiers and per minute rates used in this document are provided only for cost forecasting purposes. Competitively derived market rates may be higher or lower than the suggested rates used for cost forecasts. Reimbursement to VRS providers may be based on

⁸⁸ Based on \$33.57 per month for 1.5 to 4 Mbps download speed.

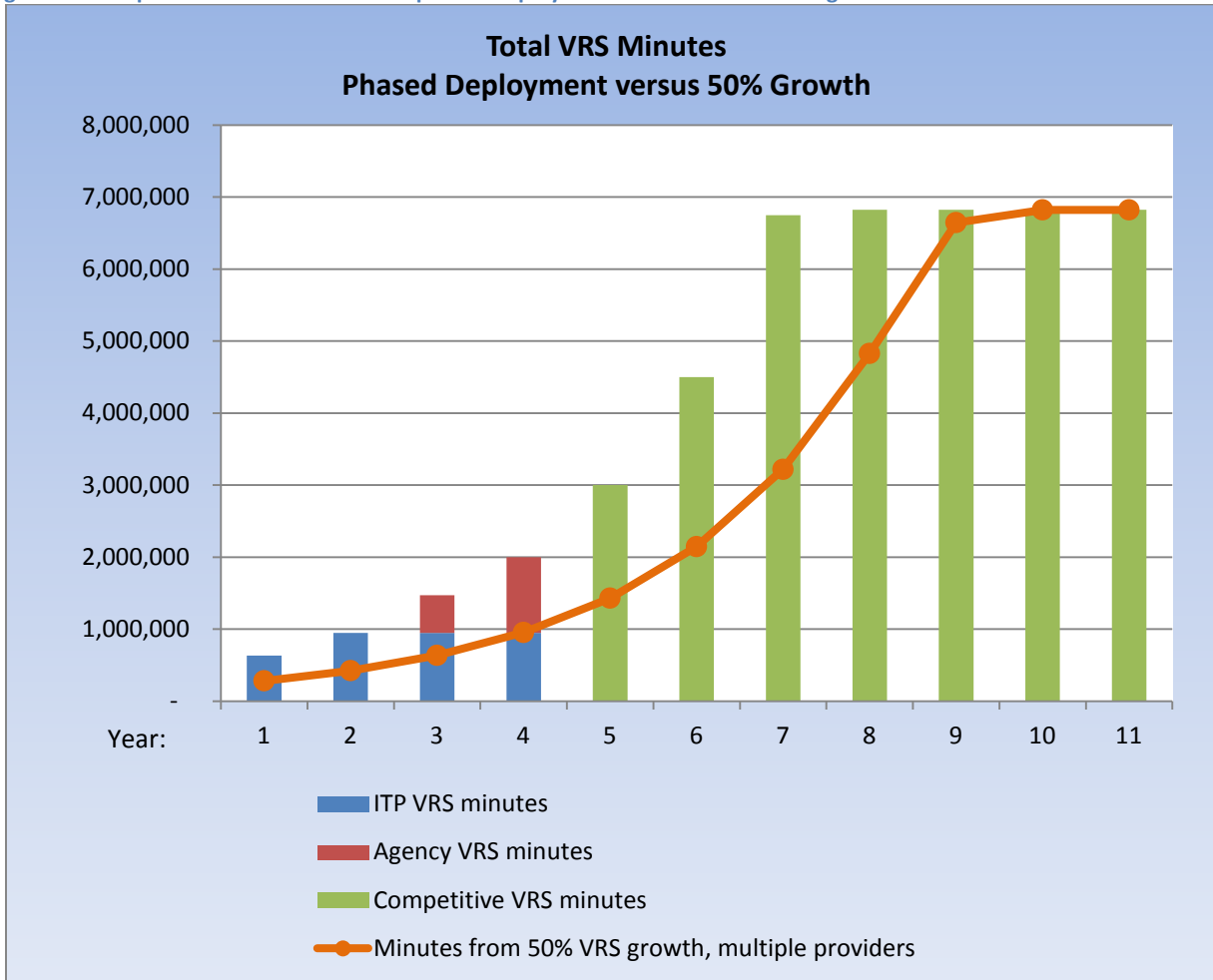
minutes of conversation relayed, or based on video interpreter hours contracted. If fixed rates are used, the rate setting methodology may result in higher or lower rates.

- Different actual provider rates (e.g., tiers) may be established for different regions of the country, for different languages (ASL vs. LSQ), for different times of the day (e.g., higher rates for weekend and nights), for different volumes of minutes (as in this cost forecast), and for different years (initial rates may be different than rates for later years)
- Public education and outreach costs may or may not be included, and may be funded as VRS program costs or may be funded by national or regional social programs outside of the VRS program budget.
- Implementation costs may be fixed at a relatively high amount during a slow growth initial period that includes additional research, and then competitively bid at potentially lower rates for subsequent years.

The many prime options of VRS models and recommendations are addressed in this study's phase 11, *Potential Canadian VRS Models*. Not all choices affect total VRS program costs, but those that will have significant cost impact will be reviewed as appropriate in this study's phase 12, *Final Report*. For example, phases 11 and 12 recommend a two-phased VRS deployment in which interpreter training programs and interpreter agencies are initially awarded grants for VRS research and service. This approach facilitates greater use of existing interpreters as well as increases the capacity of the interpreter training programs to graduate more interpreters. The result is that more interpreters are initially available for VRS in this phased deployment model than in the 50% annual growth model. More VRS minutes are therefore initially relayed, as depicted in the following graph:⁸⁹

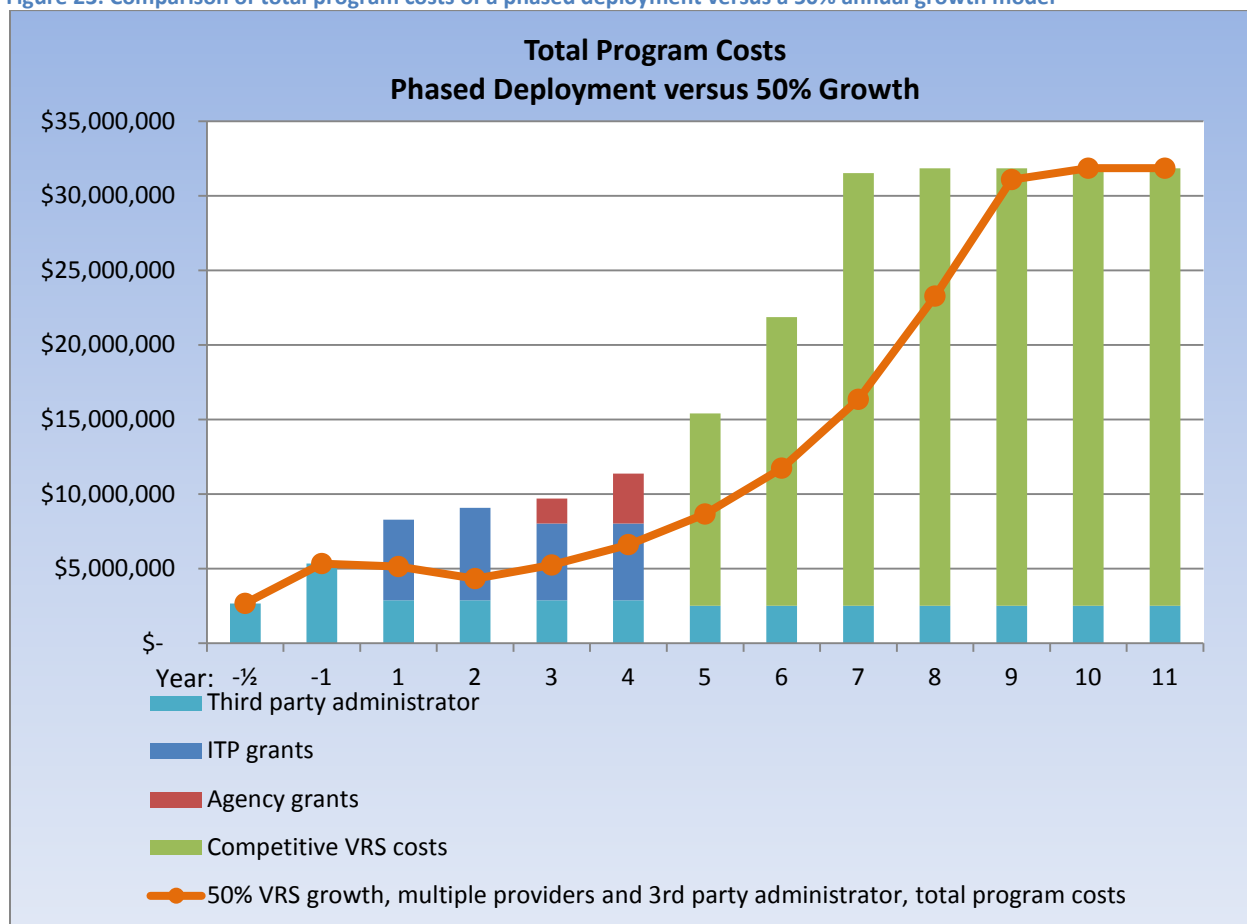
⁸⁹ For additional information about the phased deployed model see this study's phase 9 section 5.3, phase 11 sections 4.2.1, 4.3, 16.2.3 and 16.3, and phase 12 section 7.

Figure 22: Comparison of VRS minutes of a phased deployment versus a 50% annual growth model



The initial increase in minutes of relay from a phased deployment naturally results in initially higher costs associated with paying for more service. The following chart contrasts the total program costs of the phased deployment against the costs of the 50% annual growth model. Note that the costs include a year-and-a-half of third party administrator costs (including VRS platform and database) prior to the start of VRS service to the public.

Figure 23: Comparison of total program costs of a phased deployment versus a 50% annual growth model



6. Summary of Assumptions, Impacts and Outcomes

The assumptions and variables related to VRS service, the size of the Canadian VRS user community, their individual needs, and the costs to provide this service, are referenced throughout earlier phases of this VRS feasibility study. Additionally the most significant assumptions and variables pertaining to costs have been presented in prior sections of this phase 10, *Cost Variables and Forecasts*.

Table 52 beginning on the next page summarizes a number of variables that may affect the cost of VRS, their potential level of impact on costs, the likelihood of occurrence, and the potential cost affect or outcome. Because these variables have been discussed elsewhere in this VRS Feasibility Study, they are listed here in an abbreviated format.

Cost variables that have the following combinations of potential impact and likelihood are color coded for risk value as follows:

Table 51: Color codes for risk values

RISK VALUE	Potential Impact on Costs	Likelihood of Occurrence
LOW	Low	Low
LOW	Low	Medium
LOW	Low	High
LOW	Medium	Low
MEDIUM	Medium	Medium
MEDIUM	Medium	High
MEDIUM	High	Low
HIGH	High	Medium
HIGH	High	High

The final costs for VRS will be determined by how all of the variables actually combine.

Table 52: Table of VRS cost variables

Principal VRS Cost Variables	Potential Impact on Costs	Likelihood of Occurrence	Potential Effect on VRS Costs (Outcome)
Legal (study phase 2)			
The CRTC may not mandate or otherwise approve a requirement for VRS interoperability.	Medium	Low	While initial usage may be reduced, costs may be increased if a provider uses proprietary services or equipment to control market share and costs.
Relayed access to 9-1-1 through VRS may be mandated 24/7	High	Low	The requirement to staff and operate a 24/7 call center will increase provider costs in a VRS that is otherwise restricted by time of day.
Consumers (study phase 3)			
The ASL and LSQ populations may be different than estimated.	High	Medium	May increase or decrease overall cost
The ratio of ASL to LSQ populations may be different than estimated.	Medium	Low	May increase or decrease cost to serve one group
The adoption rate of (actual demand for) VRS by the ASL or LSQ populations may differ (one group may adopt at a higher rate than the other).	Low	Low	May increase or decrease cost to serve one group compared to the other
Canadian consumers may be more knowledgeable about VRS and ready for the service than initial U.S. consumers were.	High	Medium	Adoption <i>rate</i> and related costs may be higher than forecast if other constraints do not prevail
Canadian consumers may have a more pent up demand for VRS than initial U.S. consumers were.	High	High	Adoption <i>rate</i> and related costs may be higher than forecast if other constraints do not prevail

Principal VRS Cost Variables	Potential Impact on Costs	Likelihood of Occurrence	Potential Effect on VRS Costs (Outcome)
Technical (study phase 5)			
Technical assistance to VRS consumers may be insufficient or not in an accessible format.	Medium	Medium	May reduce the adoption <i>rate</i> and related costs but only minimally impact the eventual total adoption
Interpreters (study phase 6)			
The overall number of available and qualified interpreters may be less than estimated.	High	Medium	Will decrease the ability of VRS to meet the demand for service; hence usage and cost will be reduced
The number of available and qualified ASL or LSQ interpreters willing to work in VRS may be different than estimated.	Medium	Medium	The availability of VRS will be disproportionate for the ASL and LSQ communities. Usage and related costs will be related to VI availability
Availability of ASL interpreters may be greater than LSQ interpreters, in the beginning and over time.	Medium	Medium	Usage and costs of LSQ VRS will lag behind ASL VRS
The number of interpreters will not support the VRS adoption or demand forecasts	High	High	VRS traffic and related costs will be restricted to the availability of Vis. VRS usage and costs will be less than forecast.
Interpreter training programs (colleges) may not be able to develop interpreters fast enough to meet the consumer demand for VRS.	High	High	Availability will need to be artificially restricted or there will be excessively long wait times. Restricted service will reduce cost estimates.
There is negative public reaction to too many interpreters being removed from community interpreting for employment with VRS.	High	High	CRTC may decide to restrict VRS usage in order to balance interpreter availability between VRS and the community. Restricted service will reduce cost estimates.

Principal VRS Cost Variables	Potential Impact on Costs	Likelihood of Occurrence	Potential Effect on VRS Costs (Outcome)
Quality of Service (study phase 7)			
Consumer education (particularly to hearing users) may be insufficient.	Low	High	Usage and related costs may be somewhat lessened if consumers' VRS calls are frequently hung up on by the hearing party
VRS fraud and misuse may be a significant occurrence	Low ⁹⁰	Low	High levels of fraud and misuse will take away interpreter and funding resources that should be available for legitimate VRS calls
VRS interpreter work schedules (length of shift, amount of call time, etc) may be different than estimated. (The number of minutes per hour VIs are expected to relay varies by provider.)	Medium	Medium	The amount of VRS traffic (minutes of use) that can be relayed and their related costs will increase or decrease depending upon work schedules
Quality of Service feedback mechanisms may be insufficient or there may be a lack of administrative and consumer oversight of QoS.	Low	Medium	If ongoing QoS is not addressed, the consumers' experience and usage and related costs will be diminished.
Potential Related Services (study phase 8)			
Video Remote Interpreting (VRI) may be made a part of VRS services. (This is unlikely because VRI is not considered a telecommunications relay service and therefore is outside the jurisdiction of the CRTC.)	High	Low	VRI demand is unknown, but potentially could be quite high; thereby significantly increasing VRS usage and related costs
The VRS platform could be made available to VRS providers for VRI use, but paid for by the VRS providers and VRI consumers	Low	High	No effect: costs borne by the VRS program would not be affected by VRI
Other potential services, such as video mail, other modes of visual communications (e.g., speech-reading), availability of specialized interpreters, French-ASL and English-LSQ translations, and interfacing with 9-1-1, may not be included within VRS.	Low	Medium ⁹¹	The unavailability of these services will generally not lessen the demand and related costs for VRS
Forecasts of VRS User Demand (study phase 9)			
Canadian VRS users may average more or less than the 444.5 VRS minutes per user per year used in the Canadian forecasts.	Medium	Low	Costs will increase or decrease relative to changes in demand

⁹⁰ The impact and likelihood of fraud and misuse in Canadian VRS is dependent upon the controls put in place by the CRTC and the contracting authority. If few controls are implemented, then the potential impact and the probability of fraud and misuse will both be "High".

⁹¹ Some of these other services are likely to be included, while others are not. This "Medium" rating represents a blend of probabilities. See this study's phase 8 for more information.

Principal VRS Cost Variables	Potential Impact on Costs	Likelihood of Occurrence	Potential Effect on VRS Costs (Outcome)
The number of actual Canadian VRS users may be different than forecast.	Low	Low	Since potential differences are not expected to be significant, impact on costs should be minimal
Cost Variables and Forecasts (study phase 10)			
Actual market rates for VRS provider reimbursement may be higher or lower than the rates used for cost forecasting purposes.	Medium	Medium	Contracted rates and resulting program costs would be lower or higher than forecasted
The CRTC may not authorize enough funds to pay for a full-service 24/7 VRS. If enough funds are not available, either VRS will not be approved, its availability and related costs will need to be constrained, or it will need to be paid for in part by consumers	Medium	Low	Reduced availability of funds will likely result in reduced VRS hours rather than non-approval of VRS or the requirement that consumers pay its costs
U.S. provider rates have Outreach and Marketing cost elements that may not apply to Canada.	Low	High	The need for outreach and marketing to users and the general public will remain and would still be an additional cost of the Canadian program.
The cost of VRS interpreters in Canada may be higher than estimated, in part because of the more limited number of qualified interpreters.	Medium	Low	If VRS demand creates an escalating cost for interpreters, overall costs may increase, both for the program and for community interpreting
Usage costs may be partially paid for by the consumers instead of by VRS program funding	Medium	Low	May significantly reduce the demand for VRS and therefore the cost to the program, depending on how much of the cost is borne by consumers
End user VRS equipment may cost the consumer, instead of subsidized or paid for by others	Low	High	May slightly reduce the adoption rate and related costs but only minimally impact the eventual total adoption
End user broadband service may cost the consumer, instead of subsidized or paid for by others	Low	High	May slightly reduce the adoption rate and related costs but only minimally impact the eventual total adoption
VRS Models (study phase 11)			
The adopted Canadian model may initially be less than a full 24/7 service.	Medium	High	Providers may slightly reduce their proposed per minute cost, as they would not need to staff for low volume (less profitable) traffic periods. If they already provide interpreters during these low volume times, no reduction in cost may be realized.

Principal VRS Cost Variables	Potential Impact on Costs	Likelihood of Occurrence	Potential Effect on VRS Costs (Outcome)
Canadian ASL VRS may be provided by companies located in the U.S.	High	Medium	If other constraints do not prevail, the availability of ASL VRS to Canadian consumers and their adoption rate and related cost could be very high
Consumers may be required to register before they can use VRS. (Registration may be used as a means to regulate usage – restrict who is approved to use VRS, limit minutes of use per consumer, and/or share costs by consumers). ⁹²	Low	Medium	May restrict usage and related costs to the degree that registration is used as a tool to limit consumer access to VRS or modify consumer behaviour
The CRTC may not approve an open market for providers (multiple providers competing for customers)	Low	Low	Adoption rates and related costs may be less than those experienced in the U.S.
VRS providers may be precluded from offering point-to-point video calling for free (since point-to-point is not relay). ⁹³	High	Low	Consumer demand for VRS may be lessened, significantly reducing the adoption rate
The CRTC may elect to begin offering VRS through a well planned multi-year initial implementation research phase. ⁹⁴	High	Medium	May decrease or regulate usage during the research phase, but may facilitate the ability to accommodate higher demand after the initial phase

7. Conclusion

Many of the variables that will influence the final cost to implement VRS in Canada remain undecided or uncertain at this time. These include dependence on other factors such as the availability of interpreters and the cost of labor when the service is deployed. A few variables may be used to potentially control or limit total costs. Cost limits are generally accomplished by limiting consumer use of the service or by financially limiting the providers’ ability to offer the service. Limits on consumer use experienced in other countries (but not the U.S.) are restricting user access via time of day, by minutes of use, and/or by requiring consumers to pay for all or part of the service. Financially limiting providers’ ability to offer the service without effective controls on consumer demand can lead to significant quality of service issues.

⁹² May also be used as one means to respond to potential fraud or misuse.

⁹³ Point-to-point video calling without the use of an interpreter is estimated to represent about 80 percent of the call traffic carried by the VRS provider’s systems, but without significant cost to the provider or the VRS program.

⁹⁴ All countries except the U.S. have entered into VRS via a trial period. While the CRTC has authorized a VRS trial currently conducted by Telus/Sorenson, a new research phase could address issues pertinent to how VRS may best be implemented on a full scale, rather than to answer the question whether or not VRS is technically feasible.

While U.S. VRS data can be informative for forecasting Canadian VRS usage and costs, there are significant discrepancies within the U.S. data that make its application to Canada problematic. Additionally the Canadian environment (numbers of available interpreters, etc) is significantly different from the U.S. to warrant significant modification of any application of U.S. data to Canada. In fact, suggested Canadian VRS provider reimbursement rates are best derived from new analysis of Canadian cost factors.

In the past estimates have been offered to the CRTC that VRS in Canada may cost between \$50 to 100 million CAD. Using the forecasting methods in this analysis, the cost of a full 24/7 deployment of VRS is significantly less as shown in the table below. Also estimated are the costs of a 12-hour 5-day schedule for VRS.

Table 53: Annual VRS provider and administrative forecast costs, at full subscription

Forecast ongoing VRS annual program costs	24 x 7 VRS	Restricted Hours VRS
Annual provider costs:	\$29,329,666	\$24,343,624
Annual administrative costs:	\$2,510,000	\$2,510,000
Total costs:	\$31,839,666	\$26,853,624

These are forecast costs. Actual costs are expected to represent market conditions, and may be higher or lower than the cost forecasts.

During an anticipated multi-year implementation, the maximum forecasted may not be reached until the tenth or eleventh year, depending upon the consumers’ rate of VRS adoption and/or depending upon possible usage restraints to mitigate costs. These costs do not include potential consumers’ costs or the potential costs of education and outreach.