Phase 7:

Quality of Service

VRS Feasibility Study

Mission Consulting

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QUALITY OF SERVICE

EXECUTIVE SUMMARY

1. Overview

This research summary represents the findings of the seventh 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 7 research summary, *Quality of Service*, provides an overview of considerations for the Quality of Service (QoS) of VRS, including:

- ☑ Technical Considerations
- ☑ Operational Considerations
- ☑ Interpreter Considerations
- ☑ Oversight and Enforcement
- ☑ Consumer Outreach and Education
- ☑ Feedback and Improvement Mechanisms

This Quality of Service research summary provides a high level overview of QoS factors that should be considered in planning and implementing VRS in Canada. This research summary is not intended to provide specific recommendations of QoS measurements or thresholds.

2. Summary Findings

Salient points of this analysis include the following:

<u>Technical QoS considerations</u>

- □ VRS providers should be contractually bound to meet network, technical staff, security, and operational QoS standards.
- □ VRS provider contracts can include measurable Service Level Agreements to facilitate QoS.
- □ End user bandwidth, camera resolution and refresh rates are the principal consumer QoS technical factors.

- □ Minimum bandwidth, hardware, and software requirements must be clearly communicated to VRS end users.
- □ User technical instructions and communications should be communicated in ASL, LSQ, and jargon-free text whenever possible.
- □ End user technical support will be a necessary and ongoing component of a successful VRS program.

Operational QoS considerations

- □ QoS in operational factors should be required, and monitored by the VRS administering agency.
- □ Standards should be defined for a variety of operational factors, including reliability, redundancy, technical problem resolution, network blockage/throughput, average speed of answers, call queuing, and answering and handling of emergency calls.
- □ Rules regarding potential fraud and misuse should be defined, and conditions monitored and responded to.
- □ Providers should be responsive to consumers' communication preferences.
- □ QoS should extend to non-VRS functions such as customer service and technical support.
- □ Consumers may view equipment interoperability as a QoS factor, and interoperability requirements should be defined with consumer input.

Interpreter QoS considerations

- □ Minimum certification and training standards should be defined and required for interpreters working in VRS call centers.
- □ Regular monitoring of interpreter quality of service, and ongoing interpreter professional development are important QoS considerations.
- □ Special signing vocabulary or other skills may be expected by consumers.
- □ A variety of interpreter working conditions will affect Quality of Service, and should be defined for optimum service delivery.

Oversight and enforcement

- □ Minimum QoS standards should be clearly defined within the VRS provider's contract in measurable, reportable thresholds before the implementation of VRS.
- □ Active QoS reporting, review, notification of the administrative agency, and correction all should be part of normal VRS management operations.
- □ A VRS provider's non-compliance with agreed upon QoS standards should result in actions designed to cooperatively motivate the provider to improve services.

Consumer outreach and education

- Public outreach and education to both Deaf and hearing populations will be critical to the success of VRS.
- Outreach should engage consumer groups, and should be in a variety of media and formats, including sign language.

Feedback and improvement mechanisms:

- Automated QoS measurement and reporting should be required of the VRS provider(s).
- The VRS administering agency should be allowed to request periodic and ad-hoc reporting, perform site visits, and obtain consumer feedback.
- Consumer complaint and feedback mechanisms will be critical to achieve and maintain high quality performance of VRS.
- Advisory committee participation will be a key component of VRS quality of service.

A summary of QoS considerations with suggested relative weighting of importance is provided in the table below. Note that a "low" weighting does not mean that its threshold or minimum requirement of that item should be set at a low level. "Low" only means that its importance relative to the importance of other QoS factors is less than factors identified as "medium" or "high". Likewise a "high" rating does not mean that its threshold or minimum requirement should be set at a high level. Importance is more a measure of relative emphasis that should be placed in the overall design of the service and its contract. The actual adoption and implementation of QoS factors will affect VRS usage and costs, and will be discussed again in this study's phase 10, Costs, and phase 11, VRS Models. Also, depending upon how a QoS factor may be incorporated into the model, many QoS factors are expected to change as VRS services mature over time. For example QoS for average speed of answer (ASA) may be initially longer than desired when VRS begins, but as more interpreters become available over the implementation/ ramp-up years, the ASA standard may shorten.

VRS QUALITY OF SERVICE FACTORS	IMPORTANCE	TYPE OF QoS
Vendor QoS Technical Factors		
Network blockage/throughput	High	Required e.g., p.01
Average speed of answer (ASA)	High	Initial Goals e.g., 120 seconds
Call queuing	High	Required by defined call type
Answering of 9-1-1 calls	High	Required training & short ASA
Technical problem resolution and reporting	High	Required defined process

VRS QUALITY OF SERVICE FACTORS	IMPORTANCE	TYPE OF QoS
Technical staff knowledge and competence	High	Required expectations defined
Technical redundancy	Medium	Mixture of Goals & Requirements
Technical reliability	Medium	Required expectations defined
Operational QoS Factors		
Restrictions of fraud and misuse	High	Required clear rules
Extension of QoS (including ASL/LSQ, ASA, etc) to non-relay functions such as customer service and technical support	High	Required objectives defined
Equipment and service interoperability	Medium	Required expectations defined
Employment of Deaf in vendor operations	Medium	Goals expectations defined
Consumer QoS Factors		
All communication, outreach and education to end users is communicated in ASL, LSQ, and jargon free English and French	High	Required defined rules
End user technical requirements are clearly identified	High	Required defined rules
Availability of end user technical support	High	Required expectations defined
Availability of end user bandwidth and equipment	Medium	Market availability support defined
Consumer and public education and outreach	Medium	Recommendations defined rules
Interpreter QoS Factors		
Minimum interpreter standards	High	Required defined rules
Specialized and ongoing interpreter monitoring and training	High	Required defined goals
Special signing experience and skills	Low	Recommendations defined goals
Minimum speech and auditory standards	Low	Recommendations defined thresholds
Maximum interpreter engagement durations	High	Required e.g., 20 minutes
Other interpreter working conditions	High	Required various

VRS QUALITY OF SERVICE FACTORS	IMPORTANCE	TYPE OF QoS
Oversight and Enforcement QoS Factors		
Clearly defined QoS requirements	High	Required clear definitions
Active reporting, review and notification of QoS status	High	Required expectations defined
Consequences for non-compliance	Medium	Required expectations defined
Feedback and Improvement QoS Factors		
Automated measurement and reporting	High	Required expectations defined
Periodic QoS assessments	Medium	Recommended expectations defined
Complaint/Improvement processes	Medium	Required processes defined
Active Consumer Advisory/Monitoring Committee	High	Required roles defined

3. Conclusion

There are a wide range of QoS factors to consider in provisioning VRS. These include issues related to the provider's network, staff, and operations; consumer issues; as well as community education, outreach and feedback.

All stakeholders (including representatives of the Deaf user community) should be included in the planning and definition of QoS standards.

QoS factors for VRS may be specified and managed by the regulatory agency and managed by its staff or by an administrative agency or designee(s). To guarantee that effective QoS goals and reports are provided by VRS contractors, QoS requirements will need to be specified in a Request for Proposal (RFP) or other procurement document in advance of provider selection or system implementation.

QoS standards have been established in other counties, but they vary between countries and between providers. Actionable QoS requirements and the consequences for not meeting them should be clearly delineated in VRS provider contracts.

The ongoing success of a VRS system will require continued monitoring and possible modification of these QoS standards and requirements. Several of the requirements (such as ASA) have been modified in most country programs as the service progressed from a trial phase to a permanent service, or as service capabilities matured.

Consumer feedback and other forms of ongoing performance assessment are necessary to ensure quality improvement and customer satisfaction.

None of the Quality of Service factors should pose a significant challenge to the development and implementation of a Canadian VRS, although some will need to be adopted and strengthened over time as the capability of the service and its resources mature. The inclusion of QoS standards in the service will ensure the best possible Canadian VRS program.

QUALITY OF SERVICE

RESEARCH SUMMARY

1. The VRS Feasibility Study

This research summary represents the findings of the seventh 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.

The twelve phases of the study are:

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 7 research summary, *Quality of Service*, provides an overview of considerations for the Quality of Service (QoS) of VRS, including:

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- ☑ Operational Considerations
- ☑ Interpreter Considerations
- ☑ Oversight and Enforcement
- ☑ Consumer Outreach and Education
- ☑ Feedback and Improvement Mechanisms

2. Overview of Quality of Service Considerations

Quality of Service (QoS) considerations begin with the minimum technical specifications for the networks and systems required to support VRS transmission, including both provider and consumer responsibilities for meeting these requirements. Additionally, the perceived success of a VRS program is highly influenced by the consumers' expectations for the service, and how well the provider(s) satisfy these expectations. These considerations include the skills of the interpreters, service availability (i.e., hours of operation and average speed of answer before a video interpreter is available), and the level of customer support provided. To a significant degree the success of outreach and education efforts by the providers, community stakeholders, and the administrative authorities will help consumers have informed expectations and a higher likelihood of a successful experience when using this new technology and enabling service. Finally, to ensure consumers receive a reliable VRS experience, VRS contracts may: include QoS and reporting requirements thereby clarifying the providers' legal commitment to achieve measured performance standards; provide the authority to audit and confirm compliance; and establish reasonable reporting standards, problem resolution process, and, if required, a defined penalty process for failure to perform contractual commitments.

Phase 7 of the VRS Feasibility Study, Quality of Service, references and relies upon information contained in other research phases. These include Phase 3 – Consumer Interests and Perspectives, Phase 4 – VRS Models in Other Countries, Phase 5 – Technologies and their Forecasts, and Phase 6 – Interpreter Considerations. As with these other research summaries, any relevant QoS related information that is subsequently identified as being applicable to a Canadian VRS model may be incorporated into the final VRS Feasibility Report.

3. Technical QoS Considerations

In order to ensure an end-to-end quality VRS experience for consumers, minimum technical requirements must be met by the VRS providers' systems and networks , as well as by the consumers' "end-user" devices (such as a PC, mobile tablet, or similar equipment) and its supporting network. While provider requirements may be specified in their contracts, consumers' technical requirements must be clearly disclosed by both the provider and administrative program outreach and education efforts.

3.1. Provider Network and System Requirements

A VRS provider must create and maintain a network which guarantees unblocked access to its VRS system platforms. VRS providers' platforms include hardware and software components to support VRS communications, software to manage, monitor, control and report on the network and VRS systems, software to manage, monitor and report on interpreter activities, as well as a suite of customer service software to manage and report user preferences and customer service issues and their resolution.

A provider must be required to provision network services and bandwidth sufficient to handle the IP network traffic generated by video relay 'calls', as well as their related voice calls. As discussed in the

Phase 5 summary report concerning technology factors, there is no global formula which can be used to determine exactly how much bandwidth or what network resources should be made available for any given VRS system or provider. Each provider must make these calculations based on the specific or proprietary software and hardware they intend to deploy, along with factors such as the number and location of VRS call centers, the number and location of interpreters and customer service personnel, fluctuation and peaks in VRS traffic volumes, etc.

Poor video quality or inaccessibility to the Video Relay Services may occur if network and system QoS is not sufficiently managed. VRS providers must have personnel on staff (or on contract) to monitor their network activity and service issues on a 24/7 basis. Additionally they must report service impacting issues to management and program administrators, as well as resolve such matters following clearly defined procedures and escalation processes.

In order to ensure that system and network QoS factors are adequately addressed and continually monitored, minimum service standards and service level agreements (SLAs) should be included in VRS provider contracts.

A significant factor is system, network and data security. Security includes not only hardware and software security to prevent hacking, denial of service attacks, viruses, botnet and other trojans; but also the security, confidentiality, and privacy of consumer data. All security measures should be safeguarded by adherence to clearly defined rules and policies that apply to all personnel and business practices.

3.2. Consumer Network and System Requirements

The consumers' Internet network connection and "end-user" equipment must be of sufficient speed and quality to successfully achieve the quality and communications offered with the VRS providers' networks and systems.

In order to maximize the quality of the consumer's experience and reduce frustrations related to a VRS provider's service, it is often the responsibility of the VRS provider to inform consumers of the minimum network connectivity, hardware and software specifications, as well as to assist with technical support. While still maintaining interoperability, individual providers may utilize different proprietary systems, and therefore each provider may have different minimum requirements. Community stakeholders and administrative agencies may also participate in pre-installation consumer education concerning technical requirements.

The end-user requirements must be readily available in the consumers' native language (LSQ, ASL, French, English, etc.), must be clearly communicated, and must be free of technical jargon and ambiguity. The use of video training aids can be effective in communicating technical issues and frequently asked questions. Additionally, customer services must be available to answer questions, and technical support must be available to assist end users with configuration and troubleshooting. These efforts will help to reduce consumer frustrations and help ensure that consumers have a successful VRS experience.

The primary minimum technical requirements and concerns which will need to be communicated to consumers are:

- Bandwidth requirements - including Internet connection speeds and issues that may result from network congestion factors
- Equipment requirements: e.g., camera and screen resolution requirements
- Installation set up of user device hardware and software (proprietary or generic), and training

3.2.1. Bandwidth and network congestion factors

If a consumer's home or other Internet connection is too slow or too congested, the end result will be VRS video that is choppy or subject to freezing or disconnection. The perception of the end user will be that the VRS service is of poor quality and limited usefulness.

Consumers must be provided clear information related to the minimum and recommended download and upload speeds for their Internet connections.

Additionally, consumers must be educated to understand potential network congestion factors. If consumers are on cable Internet connections, their network connection speeds are subject to variation and, in particular, a significant slowdown during peak usage periods. This is also true for consumers using the Internet at a shared service location (such as a school, library or public environment) that may be subject to significant network congestion issues. Mobile connectivity such as cellular is also subject to cell tower and network congestion issues. As reported in study phase 5, there is a significant difference between advertised bandwidth speeds and actual speeds.

VRS consumers on corporate networks may also have difficulty with network congestion, unless the corporate network prioritizes Internet (and specifically video) traffic. "Converged" VoIP networks are especially susceptible to this type of problem, as many converged VoIP networks prioritize voice traffic, de-prioritizing traffic which is considered less important or non-real-time. VRS users in these types of environments must have the information available to communicate to their network support personnel regarding which ports must remain open, and information regarding network traffic and speed requirements.

3.2.2. Equipment requirements

In addition to bandwidth, another important component in the overall quality of VRS is the videophone device being used by the end user. If the camera and display are not of sufficient quality, it will be difficult for the Deaf user and the interpreter to understand each other's sign language (especially when fingerspelling is blurred), and the overall VRS quality will appear poor. VRS providers must clearly communicate minimum requirements for compatible video devices or computer requirements for downloading VRS software.

There is a videophone standard that was developed to easily allow video phone calls between countries. The Common Interface Format (CIF) has a resolution of 352 X 288 active pixels and a refresh rate of 30 frames per second.[1] The majority of videophones and video devices currently distributed or recommended by VRS providers include the CIF standard as a technical specification. The Viable VPAD, Sorenson's VP-200, D-Link DVC-2000, Ojo PVP 1000, Grandstream GXV-3000, and many smart phones including the iPhone, are all examples of videophone solutions that list the CIF standard for video resolution as well as the 30 frames per second frame rates.

Even in VRS models in which equipment is provided to end users, minimum specifications must be defined and communicated for end users who wish to use their own devices, or who wish to have multiple VRS devices.

3.2.3. Set-up and training

While consumer devices are becoming more and more user friendly, many people are not technically knowledgeable, and find the task of installing or configuring new computer or electronics equipment extremely daunting.

Even if a Deaf user is proficient with computer technology and feels comfortable setting up new equipment, if the user is not familiar with video-specific settings and installations, the equipment may not be set up in the optimum configuration, resulting in low quality video and ultimately a poor quality VRS experience.

Instructions for the installation and configuration of VRS equipment and services must be provided in clear, easy-to-understand formats in the preferred language of the user's choice. Instructions should also be provided in multiple formats, for example not only written text instruction documents, but video or multi-media instructions.

Deaf users whose preferred language is ASL or LSQ may not be comfortable reading technical instructions in written languages (such as English, French, etc.), and it is therefore imperative that set up instructions be available in sign language. Addressing the challenges of the equipment and software set-up, as well as a successful initial introduction to the new service has proven both a concern and an opportunity by VRS providers worldwide.

To address these issues consider the current set-up and customer introduction practice model of Sorenson Communications, the largest VRS provider in the United States with approximately 80% of that VRS market.[2] This company provides consumers with its own video phone device, which is installed and

[1] Keith Jack and Vladimir Tsatsulin; Dictionary of Video and Television Technology; Gulf Professional Publishing; 2002; page 52

[2] Federal Communications Commission (FCC); CG Docket No. 03-123; Reply To Comments On NECA's Proposed Payment Formulae and Fund Size Estimates For the Interstate TRS Fund For the 2010-11 Fund Year; quote from NECA data; page 5; May 21, 2010

tested in the consumer's home by Deaf technicians. These installation specialists are then also able to educate the end user in sign language on all aspects of their VRS equipment and available services.

4. Operational QoS Considerations

High volume call centers have long employed very sophisticated technologies to manage their networks, call processing platforms, and personnel. These systems also have elaborate reporting capabilities, reflecting issues within the networks and systems, as well as the activities and efficiencies of call takers. VRS platforms represent the evolution of these call center systems. As detailed in this study's Phase 5 – *Technologies and their Forecasts*, VRS platform standards for member countries of the EU require multi-mode capabilities (i.e., voice, TTY, video, web chat). While many providers have developed their own proprietary VRS platforms, systems are also available in the marketplace that meet the EU VRS processing requirements.

There are many system settings that allow the VRS providers to have direct control over many QoS considerations, as well as specific reports that reflect service quality, and/or confirm the providers' compliance with contract requirements. The following VRS provider operational issues have direct impact on Quality of Service issues including the reliability of the service and the experiences of the consumers.

4.1. Reliability and Redundancy of VRS Networks and Platforms

Consumers quickly learn to rely on their relay services. For most consumers, once VRS is introduced it will be expected to be reliable. Redundancies in network devices, routes, on-site servers and other VRS platform systems, as well as uninterrupted power supplies and power generators, will help ensure that any network or system failure that threatens to impact service will result in the least disruption to consumers' VRS. Regardless of the model selected for consideration for a Canadian service, VRS networks and systems must have safeguards built into their design to perform diagnostic analysis of their performance and to inform network and system administrators of blockage, failures and irregularities.

4.2. Training of Personnel to Identify and Resolve Technical Issues

While the networks and systems may have diagnostic capabilities and technical issues may be rapidly reported, this does not resolve the problem. Providers' management and technical personnel must have a thorough understanding of their VRS systems and networks, and be trained to follow written policies and procedures to take the necessary steps to isolate the source of the problem, inform the correct technical personnel to both begin fixing the issue while also applying alternative solutions to minimize service disruption, and communicate issues, progress and resolution to stakeholders. Included in these policies and procedures would be a detailed disaster and system-outage contingency plan for various levels of potential service-impacting events, from planned events such as a system software upgrade to the unexpected complete loss of a provider's VRS facility.

All service-impacting issues should be reported to the administrative agency on a frequent basis. Outages lasting more than a brief period or occurring with significant frequency (such as an outage of more than five minutes or two failures in a seven day period) should be immediately reported to administrative agency personnel via email, along with regular status updates, and a full description of the issues and the solutions upon resolution.

Before service contracts are awarded, providers must agree to have these policies and procedures in place, and also be committed to train and reinforce training for personnel on resolving technical problems as well as their communications responsibilities. In doing so, should a service-impacting failure occur, these precautions will greatly reduce the length of time it takes to resolve a problem and inform stakeholders, including consumers.

4.3. Network Blockage/Throughput

VRS providers must follow standards in place for acceptable network blockage rates in order to ensure the quality of the experience for the end users. This is commonplace in call center service contracts. Network blockage and throughput should be separately measured for VRS calls that are delivered over a TDM voice network, and for those that are delivered in an Internet Protocol (IP) format.[3] All providers working in the VRS environment must agree and be contractually bound through Service Level Agreements (SLAs) or other means to meet or exceed these defined standards. Additional information on network blockage may be found in section 6.1, *Clearly Defined and Specific QoS Requirements*, below.

4.4. Average Speed of Answer (ASA)

Contracts for call center services routinely include minimum standards for average speed of answer (ASA) to ensure consumers' "calls" are being answered in a predictable and timely manner. Critical issues in defining ASA include:

- Defining when a call is determined to have been answered. Is the call answered at the point when an automated system interacts with the consumer, or when an interpreter is actually engaged on the call?
- Defining ASA reports so that they do not include data elements that misrepresent the consumers' experience. If a provider offers both ASL and LSQ services, but averages all calls into one statistic, efficient processing of one language may greatly distort poor service for the other. For example, large numbers of ASL interpreters, handling significantly more ASL/English VRS

[3] The U.S. TRS (MRS) standard is network blockage at rates equivalent to the public switched telephone network, p.01: not more than one call in 100 blocked during the busy hour (of an average day), and for TRS also on a daily basis. See paragraph 65 on page 28 of www.fcc.gov/Bureaus/Common_Carrier/Orders/2000/fcc00056.doc.

calls, might influence the averaged ASA to disguise a lack of sufficient numbers of LSQ/French interpreters.

- Defining the time period to be measured. While providers may be able to answer calls quickly during certain periods of the day, week or month, there may be extended period when very few new calls are answered, and then only after waiting for a long time.

Accurate reporting of ASA is critically important to hold providers' accountable for their service level, to fairly measure one provider's services against others, and to provide administrators and regulators with meaningful data as they manage the service and plan for the future. Additional information on ASA may be found in section 6.1, *Clearly Defined and Specific QoS Requirements*, below.

4.5. Call Queuing

VRS call queuing QoS standards usually stipulate that VRS calls should be accepted and queued to be answered in the order that they are received. Typically no preferential treatment for any call is allowed, except in two instances: 1) emergency 9-1-1 calls, and 2) other specialty calls requiring special language or other skills that have been previously scheduled via appointment, if allowed in a provider's contract.

While an existing VRS provider may be able to leverage personnel located at multiple sites by distributing Canadian VRS calls to facilities that handle other countries' VRS traffic (e.g., United States if allowed), or that provide other services such as VRI, conflicts in call queuing and prioritization may result. These issues and options will need to be considered and resolved in the preparation of the Canadian VRS contract requirements.

4.6. Handling of Emergency Calls

VRS providers may be mandated to accept 9-1-1 calls in a similar manner to TTY relay and IP relay. Whether mandated or voluntary, any VRS provider accepting 9-1-1 calls must have strict quality controls in place to ensure that 9-1-1 calls are answered immediately. Besides priority queuing of 9-1-1 calls, other 9-1-1 quality control issues must also be considered. For example, the VRS providers and the VRS administering agency must have worked with local and provincial Public Safety Answering Points (PSAPs or 9-1-1 call centers) to document any appropriate 9-1-1 call routing procedures in the caller's service area. This issue is of extra concern and complexity when VRS calls are accepted from Deaf users via mobile devices. Additionally VRS interpreters and call center managers must be trained in 9-1-1 call handling procedures and issues. Close and regular communication between the VRS providers, PSAPs, the 9-1-1 administering agencies, and the VRS administering agency regarding 9-1-1 call handling procedures should take place.

In addition, the provider's website must have clear and precise instructions for the users on how they should contact emergency services through 9-1-1. These instructions should be provided in both sign language and text, i.e., LSQ and French, and ASL and English.

Within the suite of VRS traffic reports required from providers, a clear accounting of emergency calls is required to confirm service availability, performance, and to facilitate the improvement of future outreach and education for Deaf consumers.

4.7. Fraud and Misuse

Fraud and misuse of VRS has been well documented in the United States. Examples presented below included providers who were well known as established contractors to State and Federal relay programs, as well as other providers and VRS subcontractors who generated VRS call activity to bill for services that were not between Deaf consumers and the parties they typically communicate with. Some of these activities included organized VRS telemarketing calls that were intended to maintain interpreter billing at the maximum number of minutes per hour and hours per shift. Other instances relied on the anonymity of the video interpreter (VI) to conduct questionable businesses (e.g., VI to VI calls), harassment of others, or taking advantage of Deaf consumers by artificially putting a call on hold in order to take a rest break.

If unchecked, fraud or misuse of VRS may ultimately impact overall program QoS in that it affects the use and availability of network and interpreter resources, as well as reducing the limited funds for VRS programs. Each VRS provider must develop and implement procedures and policies to identify, report, and minimize or prevent fraud and misuse. In addition, the administrative agency must proactively monitor these fraud prevention methods to ensure the providers are not contributing to the abuse. Much of the VRS fraud in the United States occurred because of lack of active oversight of the providers.

All stakeholders must agree on definitions of fraud and misuse, as well as a process to deal with the identification and avoidance of these events. For example, managers in VRS call centers may need the authority to disable accounts or block IP addresses of users attempting to abuse or misuse the services. These managers must have the authority to identify potential abusers of the system and take subsequent action.

Not all forms of fraud and misuse are easily detectable. VRS providers must, therefore, have systems analysis procedures in place that can automatically flag callers' accounts or IP addresses which may exceed certain thresholds (over a certain number of minutes of use in one week, for example) as suspicious. Requiring VRS consumers to establish user accounts may potentially be helpful in deterring or identifying fraud or misuse; although this would be a controversial prerequisite.

Potential fraudulent activity can also be suspected on legitimate VRS calls. For example a Deaf user receives a VRS call from an individual attempting to scam or mislead the Deaf user. All stakeholders must decide if interpreters are allowed to act as advocates for their Deaf clients, and point out calls or situations which may be "scams", or if they are required to be interpreters only, and not offer any input into the nature of the call. These are issues of policy in which consumer representatives should have primacy of input.

When using VRS to commit fraud in the United States, some offenders took advantage of privacy rights and regulations, knowing that interpreters are not allowed to report the content or particulars of

relayed conversations. According to the FCC, *"Except as authorized by section 705 of the Communications Act, 47 U.S.C. 605, (video relay interpreters) are prohibited from disclosing the content of any relayed conversation regardless of content even if to do so would be inconsistent with state or local law."*[4]

Furthermore, fraud within VRS in the United States was exacerbated by the fact that many of the providers themselves were committing acts to improperly bill the federal relay program for millions of dollars. Due to the increased costs associated with fraudulent activity by the providers in the United States, in 2011 the FCC added the following requirement for a formal review and sign-off by an executive of a VRS provider's reports: *"Make permanent the interim rule requiring the CEO, CFO, or another senior executive of a TRS [MRS] provider with first-hand knowledge of the accuracy and completeness of the information provided to certify, under penalty of perjury, to the validity of minutes and data submitted to the Fund administrator".*[5]

Depending on the service model selected for VRS in Canada, regulatory and legal precautions established before service contracts begin may greatly mitigate the risk of fraud and misuse by defining appropriate billing parameters for the entity that employs interpreters.

4.8. Responsiveness to Diverse Communication Preferences

The ability to define preferences at the beginning of each call and to request specific communication modalities may be seen as basic Quality of Service by some Deaf users. Preferences may include the development of consumers' choices to be maintained on the providers' platform. Requirements for how a call is handled may also be provided on-demand with each call, such as the ability of the user to decide who will introduce the VRS call to the called party. In a VRS model that allows consumers to specify their communication call handling preferences, the VRS provider must be able to respond to requests even when certain choices are not used as frequently as others. Some special communication preferences (such as specialty vocabulary requests) may be dependent on the availability of interpreters with certain skill sets. If these capabilities are not available, or their availability is extremely limited, the end user may perceive this a lower quality unless procedures (such as call appointments or special hours) and suitable consumer education are appropriately used to mitigate these challenges.

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[4] 47 CFR 64.604; Federal Communications Commission (FCC); Code of Federal Regulations – Title 47; Telecommunication; Part 64 Miscellaneous Rules Relating to Common Carriers; Subpart F: Telecommunications Relay Services and related Customer Premises Equipment for Persons With Disabilities; 64.604: Mandatory Minimum Standards; (2) Confidentiality and conversation content; page 266

[5] Federal Communications Commission (FCC); Further Notice of proposed Rulemaking (FNPRM) FCC 11-54; CG Docket No. 10-51; Adopted April 5, 2011

4.9. Extension of Quality of Service to Non-VRS Functions

Quality of Service standards should also be applied to providers' non-VRS functions, such as customer service and technical support. Customer support representatives must be readily available during reasonable business hours. Furthermore, they must be able to communicate in the Deaf user's preferred language, or consumers must be allowed to use a VRS interpreter to communicate with customer or technical support personnel.

Additionally, standards such as ASA, disaster recovery, etc., should be applied to these non-VRS services as well. Users should not have to wait on hold for unreasonable periods of time to communicate with customer support representatives. Establishing what is considered a reasonable average wait time, and the method and frequency for providers' to report on these activities, may be defined in contract requirements.

4.10. Interoperability

A factor of importance to consumers in the United States was the compatibility of end-user VRS video device equipment or software with equipment or services of other VRS providers and users. With multiple VRS providers in the U.S., consumers wanted to be able to place VRS calls to any provider, even when their video devices were provided by one provider. They also wanted to be sure to be able to make point-to-point (non relay) video calls between end user equipment supplied by different VRS providers. While VRS end user equipment was primarily not interoperable for a number of years, the FCC finally ordered interoperability as a result of strong consumer demand.

Interoperability can be an issue with multiple positions and viewpoints, including divergent provider perspectives. However, the views of Canadian consumers should be of paramount consequence since ultimately the service is for their use and benefit and they may expect VRS to function in the same manner as a regular telephone which can call anyone regardless of who manufactured the telephone set.

5. Interpreter QoS Considerations

The foundation of any VRS system is the quality and availability of interpreters. Even if VRS is implemented with the best and newest technology, and its availability is well-communicated to the Deaf community and the general public, the provider must be able to hire and train qualified interpreters. If consumers believe that the interpreters lack the necessary skills, may not be functioning in an ethical manner, or if a desired service is not provided, the VRS system as a whole may be deemed a failure.

The most expensive element to be managed in any call center is the labour cost and training of personnel. The challenges of hiring, training and retaining qualified VRS interpreters will be the most challenging Quality of Service issue for potential providers, including:

- the limited number of qualified interpreters;

- the VRS-specific training required to meet consumer expectations;
- the physical demands of video interpreting;
- the emotional stress often experienced by relay operators;
- the conflict between management's desire to maximize the percentage of every hour that VIs are on calls, with the reduced quality and attention a VI will have if stressed, tired or otherwise overworked; and
- the availability of other employment options if VIs elect to work for another VRS provider or engage in another form of sign language interpreting.

5.1. Minimum Interpreter Standards

Training and certification standards may be combined with levels of experience in order to achieve a minimum acceptable level of quality for interpreters, and implementation of these standards may be somewhat dependent on the VRS model chosen. However some standards and requirements must be established to ensure VRS providers adhere to minimum required standards for sign language interpreters, and that ideally there is a professional testing program to confirm that these standards are achieved and maintained. Different countries have established different requirement or procedures for defining VRS video interpreter standards.

In the United States the FCC regulations for VRS were written using language developed for traditional MRS and VI standards are somewhat vague: *"Sign Language Interpreters working in VRS must be 'qualified'…one who is able to interpret effectively, accurately and impartially both receptively and expressively, using any necessary specialized vocabulary."* In the United States, the Registry of Interpreters for the Deaf (RID) is the leading organization that has established a national de facto standard of quality for American Sign Language interpreters. [6] RID has developed comprehensive training, education and testing, called the RID National Testing System (NTS) providing National Interpreter Certification (NIC) which has three different levels (Certified, Advanced and Master). VRS providers may or may not elect to hire only NIC certified or equivalent video interpreters.

In the United States, where there are many VRS providers consumers may choose between, consumers develop their own opinion regarding the quality and professionalism of the providers' interpreting personnel. If they are not satisfied with their VRS experience with one provider, they are free to use another. This market-driven competitive element ostensibly creates an incentive for providers to hire, train and maintain the highest quality VI personnel.

Finland has a National Register of Interpreters that is maintained by many stakeholders: the Finnish Association of the Deaf, the Finnish Association of the Hard of Hearing, Finnish DeafBlind Association

[6] Registry of Interpreters for the Deaf, at www.RID.org.

and the Finnish Association of Sign Language Interpreters. Once an interpreter has completed the training to become a professional, they apply to be accepted by the members of the cooperation to be listed in the register. *"The intention of the Register is to serve the Deaf and Hard of Hearing users to ensure quality and gauge the number of resources in the field."*[7]

German sign language interpreters are not required to be members of the Association of Sign Language Interpreters. The VRS provider TeSS markets the fact that all VRS interpreters have Master's Certificates (which take 5 years to complete). The other VRS provider, TeleSign, states that they do not use interns or trainees as interpreters. Although there is no requirement, German Sign Language Interpreters may take the State Interpreter Examination (Staatliche Prüfung). Upon passing the examination, the interpreter receives a "State Approved" Sign Language Interpreter Certification.[8]

In France there is no national interpreter certification and no national register for sign language interpreters. There are various university programs that offer interpreter training, some last 2 years others take 3 years to complete. VRS provider Websourd and the sign language interpreter agency Interpretis are collaborating to develop additional formal University training programs for sign language interpreters. This lack of certification and organizational administration leads to uncertainty when it is applied to the management of a national video relay service and staffing for a level of quality. *"We don't know who's working full-time; no data, no statistics about it."*[9]

In Canada, the Association of Visual Language Interpreters of Canada (AVLIC) has a national testing system for ASL. They have developed the Canadian Evaluation System (CES) which helps interpreters achieve the Certificate of Interpretation (COI). However it takes seven to ten years to attain the certificate, only 9% of AVLIC members have earned it. There is no other national interpreter certificate for the remaining 91% of interpreters, although many take provincial examinations to work in their community. In addition, there is no national interpreter testing or certification for LSQ. Quebec service agencies evaluate and certify the quality of their own LSQ interpreters.

One challenge in introducing a nationwide VRS program may be reaching a consensus among consumers, providers, and regulators in determining the nature of VRS interpreter qualifications.[10] There may be a need to qualify them by a combination of experience, education, certification, and testing. Testing of potential VRS interpreters may be required when standards of experience and certification are not available or practical. In this case, the establishment of VRS interpreter testing

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[7] Suomen Vottomakielen Tulkit ry; Finnish Association of Sign Language Interpreters; Education and Training

[8] Bundesverband der Gebardensprachdolmetscherinnen Deutschlands e.V.; Federal Association of German Sign Language Interpreters; Annual Country Report 2008/2009

[9] Mrs. Guylane Paris; President; Association Française des Interpretes en Langue de Signes (AFILS); 2010 Interview and French Country Report for the European Forum of Sign Language Interpreters (efsli)

[10] In this instance, qualifications and standards for VRS interpreters also pertain to supervisors, and should also be established for other positions that will have direct consumer interaction, such as customer service, technical support, and etcetera.

standards is critical, and testing may be best carried out by an independent organization without a conflict of interest, i.e., not the VRS provider.

5.2. Specialized and Ongoing Monitoring and Training

Beyond the expectations for minimum qualifications, Canadian VRS interpreters may need to have additional training in ethical issues related to transparency, privacy and confidentiality, roles and responsibilities, and the conflicts, processes and remedies that may be employed when fraud or misuse is encountered or is suspected of being perpetrated upon Deaf consumers. These are issues that have specific application within VRS that are distinct from community interpreting issues. VRS providers can be required to provide this type of training before interpreters are permitted to handle live VRS calls.

Some consumers have expressed a preference to begin VRS even if the skills of the interpreters have not matured to a highly professional standard.[11] Accordingly if there is a need to initially begin VRS with a lower than ideal qualification standard, there should be the expectation and requirement that VRS interpreters achieve a specified standard or levels of proficiency within a defined timeframe.

Regardless of the initial requirements, interpreters should receive regular refresher training to reinforce the established standards, to address situations unique to VRS, and to improve or maintain high VRS quality. To ensure optimum quality of service VRS supervisors should regularly monitor the performance of the provider's video interpreters and their calls including using scripted test calls. Consistent rotating reviews should be scheduled to ensure that all video interpreters are assessed, feedback is provided, and additional training and follow up are provided as needed. All supervisors should be highly skilled interpreters in either ASL or LSQ, and not simply call center managers. Regular meetings of supervisors can facilitate assessment criteria and the discovery and agreement of best practices. Additional participation and contribution by qualified Deaf interpreters and others with specialized understandings is also highly valuable. Ongoing professional development offered by the VRS provider and/or by third parties is important for personnel retention and for continuous service improvement.

5.3. Special Signing Experience and Skills

As previously mentioned, the availability of special interpreter signing experience and skills may be perceived as a Quality of Service concern. These skills can be medical, legal or educational experience and vocabulary skills, or interpreters with certain business or education backgrounds and experience. Deaf users who have experience with quality community interpreting or VRI in which they can request interpreters with specialty vocabulary or skill-sets may expect to see these same options in a VRS environment. If these options are not available, Deaf users may perceive a VRS vendor or the VRS system as a whole to be of low quality. However, interpreters with these skills may be rare, and their

[11] See this study's phase 3, Consumer Interests and Perspectives.

availability may be very limited. The implementation of specialty VRS signing skills may not be offered initially, or may be a service which needs to be scheduled in advance until sufficient numbers of specialized interpreters can be trained and available.

If specialty skills cannot be offered, reasonable limited expectations should be communicated clearly to VRS users, perhaps on the web site, in FAQs, and by other outreach means. VRS should be set up in a way in which consumers know in advance what is available, so they are not disappointed in the service.

5.4. Minimum Speech and Auditory Standards

Applicants for video interpreter positions should be screened for appropriate speaking skills including enunciation, pronunciation, and voice tones appropriately matching the context, register, and affect of the conversation. Although speech standards typically are either not addressed or left up to the discretion of the VRS provider in other countries, minimum speech standards should be developed to ensure optimum quality communication.

Although hearing acuity is a logical requirement for an interpreter to possess, there are typically no minimum requirements or thresholds established for video relay service interpreters. None of the other countries currently providing VRS, either in trial or as a permanent service, have included a minimum auditory standard for interpreters in their VRS service contracts. There have been minimum auditory standards required for Speech-to-Speech services; however, this practice seems to be limited to that specialized mode of relay which does not have a video component.

Speech and auditory standards should be set at levels that enable clear communication but do not unduly diminish the availability of interpreters for VRS.

5.5. Interpreter Engagement Durations

Interpreter engagement standards must also be defined, and monitored by VRS providers, in order to ensure quality. Community interpreters, for example, often work in teams and trade off interpreting duties every 20 to 30 minutes, or on a predefined timeframe. However in a VRS call center environment, a video interpreter has the potential to be tied up on a VRS call for a very long duration.

Clear standards should be defined and communicated not only to the VRS providers and interpreters, but also to the Deaf end users, so that all individuals are clear on what to expect before a VRS call begins. For example, if a VRS call extends so long that the call needs to be handed off to another interpreter, all parties involved must know what to expect, and when. Standards should be in place to ensure that the relief interpreter is brought on to the call early enough to understand the context, tone, and other particulars of the call and style of communication, and that any special interpreting instructions from the Deaf person have been transmitted to the relief interpreter. Most VRS providers will accomplish a smooth transition from one interpreter to another by allowing 10 – 15 minutes of 'overlap'; where the new interpreter will sit beside the current interpreter and observe context, vocabulary, tone and other particular details that affect the communication flow. There can also be a

technical aspect to handing off a call if interpreters are dispersed among multiple call centers. In this case, the technology must be such that transition is smooth and without disruption to the conversation.

5.6. Other Working Condition Considerations

In addition to engagement durations, there are other 'working conditions' that affect the quality of a VRS call. These include:

- Consideration of repetitive strain injuries/musculoskeletal injuries (e.g. Carpal Tunnel Syndrome) associated with signing, and prevention strategies.
- Appropriate rest and break times for VRS interpreters and supervisors.
- Ergonomic considerations.
- Training, prevention, and counselling related to vicarious trauma.[12]
- Requirement to interpret sensitive, controversial or offensive conversations (e.g. swearing, intimate language, etc.)
- Availability of confidential counselling for interpreters and supervisors.
- Clear protocols about controlling conversations (e.g., telling the person being called that this a VRS call).
- Ongoing training, peer groups and supervisor review/participation.

Within the work environment individual work stations must have sufficient sound controls to ensure that relayed conversations cannot be overheard by adjacent interpreters or callers on nearby phones. Access by non-essential personnel should be strictly controlled.

The VRS working environment and considerations are unique, and are usually not adequately addressed by normal business labor laws, especially in a preventative context. The above are all working condition factors that will affect the quality of a VRS interpreter's ability to engage each consumer with quality video relay communication. Ideally the contracting or oversight agency should address these QoS factors into the VRS provider contracts.

6. Oversight and Enforcement

Prior to the implementation of the VRS system and as a consideration of the final selection of the VRS model, the VRS regulatory agency must determine who will be responsible for the day-to-day oversight and enforcement of VRS quality standards. By establishing reasonable service standards, reporting requirements and invoice documentation requirements in advance, VRS providers will be contractually

[12] Vicarious trauma results from witnessing another person's traumatic experience (or participating in their communication about such an experience). See http://www.nabs.org.au/07_vicarious_trauma.htm.

bound to perform at a professional level. Additionally, consumers will have greater confidence that VRS provider's are being managed and driven to deliver consistent and reliable services.

Some goals of an ideal VRS program may need time to be fully achieved. If so, initial and periodic milestones should be established, and providers should be held accountable in their efforts to meet these expectations.

Effective oversight and enforcement is dependent upon many issues, including the following.

6.1. Clearly Defined and Specific QoS Requirements

Quality of Service standards requirements, as described in general in this report, should be clearly defined to specific detailed levels which can be monitored. Some of the most common QoS requirements are as follows:

- Normal ASA (Average Speed of Answer) – How long it takes from the arrival of the call to the relay center platform until the time it is answered by a live interpreter ready to handle the call.
- Emergency ASA (Average Speed of Answer) – Same as above, but measured only for Emergency calls that need to be directed to a 9-1-1 PSAP (emergency, fire, medical).
- Call Blockage, voice calls – The measurement of how many calls per 100 do not make it to a relay station because all agents/trunks are busy and therefore the caller receives a busy signal or hangs up before the call is answered by an interpreter. (This can also be measured separately for Emergency vs. non-Emergency calls).
- The level of complaints received by the service – The number and nature of complaints by users to the Customer Service number, and their resolutions. These can be coded and prioritized by the nature of the complaint.

The defined standards for these requirements differ among countries already providing video relay services. However, these are quantifiable measurements that can be defined and reported for any period of time in order to provide evidence of the level of service that is being provided. Ultimately, it is up to the regulatory agency (hopefully with input from the consumer association groups, as well as potential providers) to determine what goals for each of these indices will provide a realistically achievable level of service. Most countries have different requirements for VRS compared with traditional text or IP relay. For examples, see the table below.

Table 1: QoS factors in other countries

QoS Factor	New Zealand	Australia	United Kingdom	United States
Normal MRS ASA	85% < 15 seconds	[no standard]	90% < 15 seconds	85% < 10 seconds
Normal VRS ASA	85% < 120 seconds (future)	[no standard]	[no standard]	80% < 120 seconds
MRS Call Blockage	5 per 100	5 per 1000	3 per 100	1 per 100 (P.01)
Customer Complaints	[no standard]	< 2% of all calls	< 5% of all calls	[no standard]

Unlike in the United States where there is a legal obligation to provide "functional equivalency" through VRS, in Sweden queue times during peak hours have been reported to be comparatively long. The procurement contract from the Swedish Post and Telecom Agency includes minimum goals for VRS, but only as a recommendation: 70% of all VRS calls should be answered within 30 seconds and wait-time should not exceed 60 seconds for 90% of calls.[13] In Australia the only ASA requirement is for Emergency Text calls to be answered within 10 seconds 99% of the time. In New Zealand, although they have current MRS ASA requirements, they are waiting to introduce VRS service metrics until the service matures: *"In a capped funds environment it is not practical or reasonable to introduce an Average Speed of Answer Service Quality Measure (SQM). However, the Ministry's longer term objective when funding becomes available to allow the VRS to be staffed to meet that traffic demand profile, is that 85% of VRS calls will be answered within 120 seconds."*[14]

There may be several QoS categories with each actionable QoS requirement clearly detailed, and the required reporting methodology specified. This report does not determine what the minimum requirements for Canada should be. In fact, by seeing how many variations of service models and consumer expectations there are throughout the world, it is reasonable that each country should determine its own minimum requirements. The requirements should be a balance between what consumers' believe is reasonably good service, the service volume considerations from the providers' perspective, the implications of limited interpreter resources, and program cost considerations. The ongoing success of VRS will require the continuing monitoring and possible modification of the established QoS standards, as agreed upon by stakeholders.

[13] Hecht, Robert; Swedish Post and Telecom Agency; Post och-Telestyrelsen; Interview with Mission Consulting March 2011

[14] New Zealand Ministry of Economic Development (Manatū Ōhanga); Request for Proposal for Telecommunications Relay Services; page 52; August 17, 2010.

6.2. Active Reporting, Review and Notification of QoS Status

Depending on the VRS model implemented, VRS providers may be required by contract to report on a number of QoS standards. VRS providers can be required to implement automatic periodic reporting (daily, weekly, monthly, etc.) and on an ad-hoc basis when requested.

The regulatory agency responsible for administering the VRS system should establish the reporting procedures required of the VRS providers, as well as develop internal procedures for the review and monitoring of submitted reports. Procedures should be defined to handle situations in which providers are not meeting QoS standards, and when providers fail to provide sufficiently accurate reports needed to make QoS status determinations.

In a VRS model that includes multiple providers, the providers may be hesitant to report on data and operational indices that they claim may be used by the competition. While their concerns may or may not be valid, the regulatory agency nevertheless still has the responsibility to ensure that the services provided meet the consumers' expectations and the contracted quality standards. The agency should have the right to request and audit reports that enables it to gauge and confirm Quality of Service, and ultimately authorize payment for services. An agreement may be reached whereby certain data and reports are still delivered to the regulatory agency, but are not made public (for a specified time or as mutually agreed). Another approach could be to redact any company or consumer identification from these reports as they are made public. Precaution should be taken to ensure that public disclosure is made for issues that reflect a provider's inability to deliver the consumer services according to the terms of the contract.

6.3. Consequences for Non-Compliance

Whenever possible, compliance with required standards should be encouraged in the spirit of providing a VRS system of the highest possible quality to the community. Even in a competitive VRS model, a collaborative, collegial approach can be encouraged among the VRS providers. Communication, forums, and even meetings amongst the providers to collaborate on best practices can be encouraged. In these discussions challenges that are encountered by the providers may be addressed and solutions developed that may require administrative consideration.

In most service contracts there are two ways of addressing non-compliance: 1) timely corrective action by certain due dates, or if unsuccessful, 2) penalties - including financial considerations. Whenever possible the primary means for addressing non-compliance is to establish the problem resolution process in advance, including the timeframes for corrective action, escalation of unresolved events, and the reporting process. Just as there may be penalties for poor performance, there may also be additional rewards for extraordinary performance. Agreed upon processes will reduce the administrative burden for the regulatory agency and help ensure that issues are resolved as soon as possible.

In a competitive VRS model where consumers have the ability to choose their provider, posting QoS reporting summaries and end user satisfaction levels may create an additional incentive to ensure that

providers maintain systems, networks, and interpreter QoS standards. Non-competitive models may require additional QoS specifications and enforcement penalties to ensure professional services.

In any model, the standards and requirements should be clearly defined and communicated to all parties, including consequences for non-compliance. The primary focus should be on finding ways to motivate improvement. While penalties can have their affect, the VRS provider should be considered a service partner. Ultimately it is not in the consumers' interest to place the provider in significant financial or operational duress. A cooperative and collegial environment between the VRS provider and the administrative agency should be promoted as much as possible in order to facilitate creative and acceptable solutions to problems that will inevitably arise.

7. Consumer Outreach and Education

Consumer knowledge of a VRS program is a key factor in the success of a new program. This requires a well planned introduction of the service to potential consumers in both the Deaf and hearing populations.

Effective initial communication will help create reasonable expectations. Ongoing education and outreach programs will help move this new service into the mainstream of consumer options for communication with and from the Deaf.

7.1. Public Education

If an individual is not comfortable with a new technology, the technology will not be used or it will not be used to its potential. If potential users (both Deaf and hearing) are not aware that a new form of relay service is available, they will not engage the service. While it may not be considered as an obvious element of Quality of Service, public education is integral to the success of the program.

VRS administrators and providers cannot rely on word of mouth to advertise the availability of a newly implemented VRS. A public education campaign should be undertaken to ensure that *all* Deaf and disabled users, as well as potential hearing users, who can take advantage of VRS are aware of its existence and know how to use it.

Public outreach regarding VRS education campaigns to Deaf users can be more effective utilizing advocacy groups, healthcare professionals, government agencies, schools and universities, etc. This approach takes advantage of built-in efficiencies in communicating through large established and respected orgainizations.

However, a public education campaign must include non-Deaf individuals from businesses, schools, and government agencies as well. In short, the general population must be made aware of the availability and basic functionality of VRS so that when a Deaf user places a VRS call, the receiving caller is not confused or reluctant to accept the call. Deaf consumers in the Canadian VRS trial have expressed frustration with situations in which they attempted to call agencies such as banks or Revenue Canada and were not able to conduct their call because the agency did not understand what VRS is, or did not

have business policies in place allowing Deaf users to conduct business through an interpreter. Likewise, such public businesses and agencies need to know they can initiate calls to VRS users.

Even though VRS is well-established in the United States, public education and outreach is still under discussion. Currently, the consumer groups are recommending that the FCC separate and distinguish outreach efforts from marketing, suggesting that outreach should focus on education:

> *"Legitimate outreach efforts should include education of Deaf, hard of hearing, deaf-blind and speech-disabled individuals as well as the (hearing) individuals in other sectors of the general community, and businesses so they can effectively communicate via VRS services. Additional outreach efforts to recipients of VRS calls are necessary in order for these services to be functionally equivalent to voice telephone services. The Consumer Groups therefore recommend that the Commission contract a third-party unaffiliated with any VRS provider to engage in education and outreach activities and to fund the activities form the Interstate TRS Fund."*[15]

This is the model currently used in Australia. The education and outreach component of MRS and VRS in Australia is provided under contract with an independent third-party company called Westwood Spice, and the cost is covered by the same MRS fund that also pays for MRS/VRS services.

An often overlooked component of an education or outreach campaign is to the actual Internet Service Providers (ISPs) themselves. VRS relies heavily on Deaf users' Internet connection provided by their ISP. If the ISP customer and technical support staff do not know what VRS is, or do not understand that Deaf users rely on services such as VRS in order to communicate, then they will not understand Deaf individuals' specific customer service and technical support needs. For example, difficulty in obtaining technical support was another frustration Canadian VRS trial users expressed. In some instances Sorenson indicated that a particular problem was not with their VRS system, but that it was a Telus network related problem. When the Deaf users contacted Telus, the Telus support representatives did not know about VRS, or that a VRS trial was being conducted on their network. This lack of communication and education can result in Deaf users' dissatisfaction with VRS as a service.

8. Feedback and Improvement Mechanisms

8.1. Automated Measurement and Reporting

Continuous automated measurement of performance factors such as Average Speed of Answer, network blockage, emergency call prioritization and other factors should be maintained during all

[15] Federal Communications Commission (FCC); Comments in Response To Notice of Inquiry; CG Docket No. 10-51; Telecommunications for the Deaf and Hard of Hearing, Association of Late-Deafened Adults, Inc., National Association of the Deaf, Deaf and Hard of Hearing Consumer Advocacy Network, American Association of the Deaf-Blind; August 18, 2010

normal VRS operational hours. Thresholds should be established that notify the provider's operational managers and supervisors when conditions approach or exceed the thresholds so that corrective actions can be taken. Automated monitoring of performance indicators and staffing conditions can also be used to forecast interpreter staffing needs by time of day, day of week, and by language and skills. Although this type of ongoing monitoring and staffing assessment is usually performed by the VRS provider as a normal business operation, the VRS administrative authority can ensure in its VRS contracts that modern work force management tools are employed by the VRS provider to obtain desired cost efficiencies and the desired quality of service performance.

While standards compliance and provider reporting should be automated, the ability to perform periodic reviews of all QoS components should be required of VRS providers. These periodic reviews should be stipulated in the providers' contracts, and the results should be matters of public records (especially in a government-subsidized model).

8.2. Periodic Quality of Service Assessments

Providers' contracts should also stipulate that the administering agency (or their assigned representative) has the authority to conduct periodic QoS site audits and remote testing, including anonymous covert QoS assessments. Quality of interpreting is a nuanced subject to measure. Independent assessments can be periodically conducted by interpreter educational organizations and other specialized stakeholders that do not have a conflict of interest. Such assessments should be undertaken with the view of offering suggestions for how VRS can be improved, rather than as a form of audit and punishment.

In addition to professional assessments, the consumers of the service should be periodically surveyed to determine their views of the quality of service and to identify areas of improvement and suggestions. Surveys can be done online, in the mail, and through community public education and outreach events (newsletters, town hall meetings, Deaf events, etc). These types of assessments can occur on an ongoing, periodic, random, or ad-hoc basis. Both Deaf and hearing users should be consulted. The resulting information can be used by the administering and regulatory agencies to manage the VRS program and to identify specific needs for additional consumer education or vendor improvement. For example, if one provider is seen to consistently receive more complaints for a specific region or time of day, the administrative agency can work with that provider to focus its efforts and ensure a timely solution. In another example, a pattern may emerge among all providers regarding a specific complaint throughout the service. The authorizing agency might then have insight into an issue that may affect the entire program, and would thus be in a position to take action to mitigate the issue.

Lastly, providers should be required to perform their own internal periodic audits, reviews, and tests. The resultant documentation should be submitted to the administering agency on a predefined schedule. Providers should also be required to conduct and report on QoS specific investigations in response to atypical situations or complaints as determined by the administering agency.

8.3. Establishment of Complaint/Improvement Reporting

Constructive feedback is imperative in the successful development and implementation of any new system. Multiple methods of obtaining end user feedback should be required of all VRS providers (submission of online forms, ongoing online blogs and forums, customer service representatives who sign, etc.) The administering agency should also attempt to obtain independent feedback (through consumer advocacy organizations, online surveys, etcetera) beyond what is submitted by the providers. Consumer feedback and complaint programs should be designed to allow consumers to provide information anonymously if they so choose, as well as with personal information that can facilitate a personal response or follow up from the provider.

Before beginning service, providers should have a complaint documentation process in place that identifies the time an issue is identified, nature of the problem and its resolution. Trends in consumer complaints must be analyzed and where these are not isolated events, corrective measures initiated to avoid reoccurrence. Customer complaint forms and summary reports should be provided to the administrative agency with the provider's monthly reports in support of their invoicing.

Reporting should be separated between technical feedback and interpreter quality feedback. Due to the confidential nature of personnel information, feedback regarding an individual interpreter's quality or performance may not be made available to the public in its original data format. VRS provider supervisors should review all consumer complaints and comments to ensure that improvements are realized and appropriate information is passed on to customer service personnel that can be used to respond to the consumer.

Expectations for customer service, complaint, and follow up requirements can be established in the service ordering language, whether by regulatory agency or by service RFP/contract.

In the United States the requirement for constructive feedback is minimally mandated through the FCC's Code of Federal Regulations 64.604. It states the requirement for consumer complaint logs is a functional standard that must be adhered to by all providers:

> *"States and Interstate providers must maintain a log of consumer complaints including all complaints about TRS (MRS) and VRS in the State, whether filed with the TRS provider or the State, and must retain the log until the next application for certification is granted. The log shall include, at a minimum, the date the complaint was filed, the nature of the complaint, the date of resolution, and an explanation of the resolution."* [16]

[16] 47 CFR 64.604; Federal Communications Commission (FCC); Code of Federal Regulations – Title 47; Telecommunication; Part 64 Miscellaneous Rules Relating to Common Carriers; Subpart F: Telecommunications Relay Services and related Customer Premises Equipment for Persons With Disabilities; 64.604: Mandatory Minimum Standards; (c) Functional Standards; (1) Consumer complaint logs; page 268

8.4. The Role of a Consumer Advisory Committee

A consumer advisory committee can play a critically positive role in the development, outreach, and monitoring of a new VRS program. As direct representatives of their constituencies, such a committee can provide guidance to ensure the experiences and concerns of VRS users are taken into account before and as changes to the program are made. A consumer advisory committee also lends an additional level of credibility to the effort to keep consumer issues in the forefront. A consumer advisory committee can also help plan and guide the effective dissemination of information about the program to consumers.[17]

9. Conclusion

There are a wide range of QoS factors to consider in provisioning VRS. These include issues related to the provider network, staff, and operations; consumer issues; as well as community education, outreach and feedback.

All stakeholders (including representatives of the Deaf user community) should be included in the planning and definition of QoS standards.

QoS factors for VRS may be specified and managed by the regulatory agency and managed by its staff or by an administrative agency or designee(s). To guarantee that effective QoS goals and reports are provided by VRS contractors, QoS requirements will need to be specified in a Request for Proposal (RFP) or other procurement document in advance of provider selection or system implementation.

QoS standards have been established in other counties, but they vary between countries and between providers. Actionable QoS requirements and the consequences for not meeting them should be clearly delineated in VRS provider contracts.

The ongoing success of a VRS system will require continued monitoring and possible modification of these QoS standards and requirements. Several of the requirements (such as ASA) have evolved in most country programs as the service progressed from a trial phase to a permanent service, or as service capabilities matured.

Consumer feedback and other forms of ongoing performance assessment are necessary to ensure quality improvement and customer satisfaction.

None of the Quality of Service factors should pose a significant challenge to the development and implementation of a Canadian VRS, although some will need to be adopted and strengthened over time as the capability of the service and its resources mature. The inclusion of QoS standards in the service will ensure the best possible Canadian VRS program.

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[17] Advisory Committee participation will also be addressed in this VRS Feasibility Study's phase 11, Potential Canadian VRS Models.