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November 8, 2006

Via Electronic Filing

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street SW
Washington, DC 20554

Re: *Erratum*: *Telecommunication Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities* – CG Docket No. 03-123

Dear Ms. Dortch:

Attached is a corrected version of the Declaration of Dr. John H. Johnson, originally filed in the above-referenced proceeding on October 30, 2006, as Attachment 3 to the Comments of Sorenson Communications, Inc. The corrections are minor in nature and do not change the substance of Dr. Johnson's Declaration.

In accordance with the Commission's rules, this *Erratum* is submitted for inclusion in the public record.

Sincerely,

Gil M. Strobel

Attachment

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
	)	
Telecommunications Relay Service and	)	CG Docket No. 03-123
Speech-to-Speech Services for	)	
Individuals with Hearing and Speech Disabilities	)	

DECLARATION OF DR. JOHN H. JOHNSON

I. Introduction

A. Summary

1. My name is John H. Johnson. I am an economist and Vice President of National Economic Research Associates, Inc. (NERA), an international economic consulting firm. NERA was founded in 1961 and provides research and analysis in the field of applied microeconomics, including the economics of competition, labor, regulation, and finance. I have been asked by Sorensen Communications (Sorenson) to provide an overview of the demand and supply conditions in the labor market(s) for Video Relay Service (VRS) interpreters. I have also been asked to identify the best available data on wages for VRS interpreters, and to investigate the trends in VRS interpreter wages relative to those in the labor market as a whole. In preparing this declaration, I, and economists under my direction, have reviewed available data, documents, publicly available government sources, and other available sources. The conclusions listed below constitute my expert opinion as a labor economist and are based on my review and analysis of these sources and on conversations I have had with Sorenson personnel.

2. The main focus of my declaration will be to describe the labor market for VRS interpreters. I first explain that the supply of VRS interpreters is constrained by the need for extensive training. I then discuss the growing demand for VRS interpreters, driven by demand for VRS—which has grown, and is projected to continue growing—and by the presence of competing demands for qualified American Sign Language (ASL) interpreters (*e.g.*, the need to meet government mandates and community demands for ASL interpreters in schools, courts and other institutions). If the supply of VRS interpreters is constrained while demand for VRS increases, wages for VRS interpreters can be expected to increase (all else being equal). Pressure to increase interpreter wages could be alleviated by expanding the supply of interpreters, for example, by training existing ASL interpreters so they are qualified to be VRS interpreters and increasing the number of new prospects entering training programs. Because of the extensive training required to become a VRS interpreter, any attempts to ease the expected pressure on interpreter wages will require foresight and planning.

B. Qualifications

3. I received my B.A. in Economics from the University of Rochester and my Ph.D. in Economics from the Massachusetts Institute of Technology (MIT). One of my areas of specialization at MIT was labor economics. Prior to joining NERA, I was an Assistant Professor of Economics and Labor and Industrial Relations at the University of Illinois at Champaign-Urbana. I have published papers on labor economics issues in the *Journal of Labor Economics* and the *Industrial Labor Relations Review*, and wrote my doctoral dissertation on labor economics issues. I also taught three courses on labor economics at the University of Illinois—Labor Problems, Women in the Labor Market, and Graduate Labor Economics Methods.

4. Since joining NERA, I have worked on a wide range of consulting assignments in a variety of industries. I regularly conduct empirical analyses using large data sets to answer economic questions. I also specialize in econometrics, the use of statistical techniques in data analysis. I have provided written testimony in both the United States and South Korea. My curriculum vitae is attached as Appendix A to this declaration.

5. The opinions and discussions set forth in this declaration are based on my analysis of the matter to date. I reserve the right to revise my opinion and conclusions if additional information is provided to me or if additional research leads me to change my current opinions.

II. Characteristics of the Labor Market for VRS Interpreters

A. Background on VRS

6. VRS is a type of telecommunications relay service (TRS) that allows deaf and hard-of-hearing individuals to place telephone calls.[1] Unlike other types of TRS, VRS utilizes video services, making it possible for deaf individuals to use ASL to communicate with hearing people over the phone. Typically, a deaf user initiates a VRS call by connecting to an IP address that is routed to a VRS provider's call center.[2] At the call center, a VRS interpreter uses a video screen to see the deaf caller and read his or her signs. The interpreter then facilitates the conversation

[1] In 1990, Title IV of the Americans with Disabilities Act (ADA) required the Federal Communications Commission (FCC) to provide "functionally equivalent" relay services, "to the extent possible and in the most efficient manner," to persons with hearing or speech disabilities in the United States. http://www.fcc.gov/cgb/dro/title4.html. The ADA also requires the FCC to encourage the use of improved technology in the provision of TRS.

[2] To use VRS, a deaf caller must have a broadband connection, which is not subsidized by the interstate TRS Fund. Although most VRS calls are initiated by a deaf user, hearing individuals may also use VRS to call deaf ASL users. In that case, the hearing caller uses a regular telephone to dial a toll-free number that is routed to a VRS provider (*e.g.*, 1-866-FAST-VRS). The caller is then connected to a VRS interpreter who connects the call to the deaf individual being called and begins interpreting between spoken English and ASL.

between the hearing and deaf parties by interpreting between ASL and spoken English (or Spanish), speaking to the hearing party over the telephone and signing to the deaf party over the video connection.[3]

B. Supply of VRS Interpreters

7. The supply of VRS interpreters is limited and is constrained by the fact that becoming an effective VRS interpreter requires extensive training, even beyond the years of training required to be an ASL interpreter. In order to be an effective VRS interpreter, an individual often must first meet certain minimum educational and certification requirements. The FCC classifies a qualified interpreter as: "an interpreter who is able to interpret effectively, accurately, and impartially, both receptively and expressively, using any necessary specialized vocabulary."[4] As summarized in Table 1, most of the major VRS providers require specific educational background, training, or certification from the state in which they reside and/or the Registry of Interpreters for the Deaf (RID) or the National Association of the Deaf (NAD), and significant interpreting experience.

[3] For a more detailed description of VRS, see for example, http://www.sorenson.com/press/docs/VRS_DATASHEET.pdf.

[4] http://www.fcc.gov/cgb/dro/4regs.html.

Video Relay Service Providers
ASL Interpreters Certification Requirements

VRS Provider (a)	NAD Certification (b)	RID Certification (c)	State Certification (d)	Other (e)
Sorenson	IV, V	CI, CT, CI/CT, CSC	Intermediate or Master Certificate	Professional Interpreter Experience (determined by management)
AT&T	IV, V	CI/CT, CSC	--	--
Communication Access Center	IV, V	RID[1]	State of Michigan QA	--
Hamilton Relay	IV, V	CI, CT, CI/CT, CSC	Equivalent State Certification	--
Hands On VRS	IV, V	CI, CT, CSC, NIC	--	ACCI level IV/V[2]
Verizon (IP-Relay.com)	IV, V	CI/CT, CSC	--	--
Sprint	III, IV, V	CI/CT, CSC	State Certification Where Applicable	--

-- not applicable

[1] Communication Access Center does not provide an RID level of certification required.

[2] The American Consortium of Certified Interpreters (ACCI) also provides certification at level III (generalist), IV (advanced), or V (master).

Source: VRS providers' company websites.

8. The initial pool of VRS interpreters is drawn from several major training programs in the United States. According to the RID, there are currently 158 programs offered at 108 higher education institutions that train interpreters in a variety of programs.[5] Although it is difficult to estimate the number of interpreters in the work force, according to the RID website, there were approximately 6,213 certified interpreters nationwide as of June 2006.[6] Among interpreters in the labor force, work is often sporadic and part time.[7] Many interpreters and translators have a bachelor's degree or at least some college training (associates degree).[8] The educational prerequisites for taking the national interpreter test will become even more stringent in 2008.[9]

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[5] See Appendix B for a listing of the training programs listed on the RID website. As I describe throughout my declaration, interpreters out of training programs are not immediately able to be effective VRS interpreters (¶¶11-12). Similarly, on the demand side, competition for interpreters comes from a wide range of sources. (¶¶16, 17).

[6] http://www.rid.org/faq.html. RID also lists 4,139 "associates" who support RID, but are not nationally certified interpreters.

[7] http://www.bls.gov/oco/ocos175.htm.

[8] http://www.bls.gov/oco/ocos175.htm.

[9] By 2008, anyone wishing to take the NIC Interview and Performance test will need to have an associate's degree, and by 2012, a bachelor's degree will be required. http://www.rid.org/NAD-RIDNICTestsQuestionsandAnswers.pdf.

9. State certification requirements vary by state and are non-transferable.[10] Legal requirements for qualification as an interpreter can also vary by state; for example, Pennsylvania mandates that sign language interpreters working in the state have a national certification, a relatively stringent requirement.[11] The variation in state requirements to be a qualified interpreter places additional constraints on the available supply in certain geographies.

10. The current national certification program, the NIC, consists of a written examination, an interview, and a performance evaluation.[12] As a general guideline, it is expected that 2 years of attending an interpreter-training program are needed to pass the written test.[13] It can take up to five years of professional experience to pass the interview and performance evaluation.[14] In addition to the time and money (including tuition payments) needed to train for the national test and evaluation, candidates must also pay a fee of between $500-$765 to take the NIC test.[15]

11. Even an individual who meets all the educational and certification requirements described above, however, cannot immediately be an effective VRS interpreter. There are a

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[10] http://www.nad.org/site/pp.aspx?c=foINKQMBF&b=180368&printmode=1.

[11] *See* section 5(a) of the Sign Language Interpreters and Transliterators State Registration Act, Act No. 57-2004, 63 Pa. Stat. § 1725.5(a)(1)(iii); Proposed Rulemaking, Department of Labor and Industry, 36 Pa. Bull. 3822, 3823 at §§ 501.1, 501.3 (July 22, 2006); Notice of Comments Issued, Independent Regulatory Review Commission, 36 Pa. Bull. 6064 at §§ 501.1, 501.3 (Sept. 30, 2006); NAD-RID National Interpreter Certification (NIC), http://www.rid.org/nic.html.

[12] http://www.rid.org/nicoutline.pdf.

[13] Becoming an Interpreter.

[14] Becoming an Interpreter.

[15] http://www.rid.org/Written_test_app.pdf ; http://www.rid.org/NAD_RIDapp.pdf.

number of other important qualifications and skills that are required to be an effective VRS interpreter. For example, the following is a partial list of skills required:[16]

a. adaptability to different call situations (*e.g.,* calls to doctors' offices, personal calls, conference calls for business),

b. linguistic competence (including increased ASL-to-spoken English interpreting, knowledge of different "dialects," the ability to articulate signs),

c. telephone protocol,

d. voice control,

e. customer service,

f. decision-making,

g. impartiality,

h. technology expertise, including the ability to manipulate video and computer equipment,

i. general world knowledge, and

j. specific knowledge pertaining to the Deaf community.

As a result, even after completing a certification program, it takes several years of hands-on experience (on-the-job-training) for an individual to become an effective VRS interpreter.

12. A VRS interpreter faces a range of unique situations on a daily basis. As a result, achieving an adequate supply of qualified interpreters also requires investments in training. Sorenson, for example, spends approximately $2,500 per new hire to train ASL interpreters to be able to handle the demands of VRS interpreting.[17] As I understand it, new interpreters that need a little extra help to be ready to take VRS calls are those in the pre-certified category. These

[16] Distance Opportunities for Interpreter Training Center, VRS Task Analysis Report. http://www.unco.edu/DOIT/Articles/VRS%20Task%20Force%20Report.pdf.

[17] Based on Sorenson estimates.

individuals are identified through a screening process and undergo a 60 hour intensive mentoring and supervision program at a cost of approximately $3,500 per interpreter. These individuals are those who graduate from interpreter training programs and come into VRS after 2-5 years of working in the community. Further, to remain certified, interpreters must also earn continuing education units (CEU). The professional studies units include cultural and linguistic trends; interpreting theories and skills; and specialized fields, such as law, education, or healthcare.[18] Sorenson invests heavily in providing continuing education opportunities for its interpreters. Sorenson offers CEU workshops to its employees and interpreters in the outside community. Within each region, Sorenson provides workshops that allow its interpreters to advance their initial training and earn RID CEUs. On average, Sorenson provides over 100 skill building workshops per quarter across the country. Sorenson spends at least $500-$1000 per workshop in out of pocket expenses alone.[19]

13. The educational requirements, the certification requirements, the limited number of new interpreters coming out of training programs each year, and the experience required to be an effective interpreter are all factors that place limitations on the available supply of VRS interpreters.

C. Demand for VRS Interpreters

14. VRS interpreters are specialized ASL interpreters. The demand for ASL interpreters is driven by the overall demand for VRS and the need for ASL interpreters in the community. The

[18] Based on interviews with Sorenson personnel.

[19] Based on interviews with Sorenson personnel.

demand for VRS interpreters is in part shaped by the overall demand for VRS. VRS has experienced continued growth since its inception in 2000.[20]

15. In the face of an increase in demand for VRS, all else being equal, the need for qualified VRS interpreters will also increase.[21] As the number of VRS users grows, the demand for interpreters will grow – assuming that the number of minutes per user remains constant. Thus, as the number of VRS users increases, firms will compete more intensely for new interpreters. This is particularly true given that the FCC's speed-of-answer requirements effectively prevent providers from increasing queue times in the face of increased demand.[22] Accordingly, unless and until new sources of VRS interpreting can be found or created, the labor cost per minute of interpreting can be expected to rise in the face of increasing demand. In fact, the BLS reports that the employment for interpreters and translators – a category covering a wide range of interpreting and translating jobs, including VRS interpreters – is projected to increase "faster than average" for all occupations from 2004 – 2014.[23] This eventuality can be mitigated, or even eliminated, however, if VRS providers invest in creating new interpreting capacity to meet the

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[20] See http://www.neca.org/media/090805NASRAPRESENTATION.pdf, at 18. VRS is provided at no per-minute cost to the user. http://www.fcc.gov/cgb/dro/4regs.html. As a result, from the perspective of the user, there is no incremental cost for each minute of use—deaf individuals who want to use the service do not pay for additional minutes of use, and so the number of minutes they use is affected by factors other than price. These factors include personal preferences for using ASL on phone calls, the quality of the service provided, the extent to which deaf individuals substitute other forms of TRS for VRS, the increased availability of broadband access (allowing more individuals the required video access to interpreters), and changes in the price of broadband services. (VRS users must pay for their own broadband connections and these costs are not subsidized by the interstate TRS Fund.)

[21] Of course, demand for VRS is finite and is constrained by a number of factors, including the total number of deaf ASL users and the cost and availability of broadband.

[22] Similarly, there is no viable way to simply increase the number of minutes per hour that interpreters can spend relaying conversations given safety requirements for breaks, logistical time to set up and break down calls, and the long run realization that quality of service and the ability to retain workers for the long haul are adversely affected by increased hours worked.

[23] See http://www.bls.gov/oco/pdf/ocos175.pdf. A rate growing "faster than average" is defined as between 18 – 26%; see BLS Occupational Outlook Handbook: http://www.bls.gov/oco/oco20016.htm.

expected increase in demand for VRS. This can be done in a number of ways. For example, providers could invest in training new interpreters, provide existing ASL interpreters with the additional training necessary to qualify them to provide VRS interpreting, and/or seek additional hours from the existing work force.[24]

16. Individuals qualified to be VRS interpreters are also qualified for many other types of jobs, all of which compete for interpreters' services. Demand for ASL interpreters comes from a variety of sources, including local school systems, hospitals, and local and state governments – all of which are mandated by the ADA or other federal mandates – as well as private industry.[25] Several VRS interpreters acknowledge that they want the "regular personal touch" associated with interpretation work in a community setting.[26] As a result, interpreters who value working in a community setting or with children in an educational setting may choose to forgo VRS interpreting or only want to work part-time at VRS call centers. Attracting qualified, well-trained, and experienced interpreters for VRS requires firms to be flexible by, for example, offering part-time work arrangements.[27]

17. Demand for VRS interpreters is also likely to vary by geography. For example, several VRS providers have call centers within close geographic proximity to major cities. In these

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[24] Another possibility would be for providers to hire interpreters away from other jobs. This alternative is likely to be unappealing to providers, the FCC and the deaf community, however, given that qualified interpreters are needed to meet other government mandates and to provide general interpreting services to the deaf community in schools and other settings. The Rehabilitation Act of 1973, the Individuals with Disabilities Education Act ("IDEA") and the Americans with Disabilities Act all are examples of laws requiring the provisions of interpreters for the deaf. Several court cases also mandate the provision of interpreters.

[25] Elka Jones "Interpeters and Translators" in Occupational Outlook Quarterly, Summer 2002. http://www.bls.gov/opub/ooq/2002/summer/art02.pdf.

[26] Distance Opportunities for Interpreter Training Center, VRS Task Analysis Report, at 23. http://www.unco.edu/DOIT/Articles/VRS%20Task%20Force%20Report.pdf.

[27] Over 85% of Sorenson's interpreters are part-time employees. Similarly, BLS also describes a significant number of part-time workers in the category of interpreters and translators. http://www.bls.gov/oco/pdf/ocos175.pdf.

areas, there will be increased competition for the same pool of potential VRS interpreters. Similarly, the demands of the local deaf community will vary by region; certain cities are likely to have more local programs (*e.g.*, schools) that provide further competition for local interpreting resources. Finally, different locations will be characterized by different general economic conditions; the implication is that the outside opportunities for interpreters vary in terms of both their alternative employment choices and their potential wages.[28]

18. As I understand it, providers must also be sensitive to the need to have ASL interpreters available to serve in the Deaf community and to meet other government mandates, such as the need to provide interpreters in courtrooms, local college classrooms, mental health settings, medical and other public settings.[29] These community-based interpreters must be physically proximate to the institutions they serve (*e.g.*, the local courthouse) and therefore cannot easily provide VRS interpreting at a call center located outside their local area. At the same time, VRS providers cannot place call centers in every community where there are ASL interpreters. Simply put, VRS providers cannot hire all of the qualified interpreters nationwide. Accordingly, VRS providers must begin investing now to increase available interpreting capacity in light of the expected increase in VRS demand. Otherwise, wages can be expected to rise, putting pressure on the per-minute reimbursement rate for VRS.[30]

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[28] It is not surprising that the prevailing wage rates for VRS interpreters vary by geographic region; this is reflected in the BLS wage data for interpreters and translators as well.

[29] Both legal requirements and court cases have mandated the provision of interpreters in these settings.

[30] The pressure on wages might also be mitigated by increases in efficiency, but interpreter efficiency is effectively limited by factors such as regulatory requirements (including speed-of-answer and 24/7 availability), worker safety rules (such as limits on the amount of time interpreters can spend at their terminal) and logistical issues (*e.g.*, the non-reimbursable time needed to set up and "break down" calls).

III. Evidence on Wages of VRS Interpreters

19. Given the increasing demand for qualified interpreters and the limited supply of interpreters, one would predict that, all other things being equal, wages for interpreters would be increasing. This prediction is supported by the publicly available data, which (as explained below) shows that in every year from 2002 to May 2005, the year-to-year growth rate for wages for interpreters and translators has been higher than the growth rate for all occupations. Although information on wages of VRS interpreters is very limited, I have identified a publicly available data source to analyze the trends in wages for VRS interpreters from the Bureau of Labor Statistics (BLS).[31] The BLS is the "principal fact finding agency for the [US] government in the broad field of labor economics and statistics."[32] The BLS collects data on employment and earnings on a wide range of occupations through the Occupational Employment Survey (OES).[33] The survey data is collected from employers in all industry sectors in metropolitan and non-metropolitan areas from 50 states and the District of Columbia.[34] The survey provides an estimate of the mean hourly wages, employment, and earnings for all workers, as well as providing detailed estimates by various occupational groups.[35] The data is reported in six-month

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[31] The RID also reports some ranges for interpreter wages (see http://www.rid.org/faq.html).

[32] http://www.bls.gov/bls/infohome.htm.

[33] *Wages* for the OES survey are straight-time, gross pay, exclusive of premium pay. Base rate, cost-of-living allowances, guaranteed pay, hazardous-duty pay, incentive pay including commissions and production bonuses, tips, and on-call pay are included. Excluded are back pay, jury duty pay, overtime pay, severance pay, shift differentials, non-production bonuses, employer cost for supplementary benefits, and tuition reimbursements. See http://www.bls.gov/oes/current/oes_tec.htm.

[34] http://www.bls.gov/oes/oes_ques.htm#Ques1.

[35] The OES survey uses the Standard Occupational Classification (SOC) used by the Office of Management and Budget. See http://www.bls.gov/oes/current/oes_tec.htm. *Occupational employment* is the estimate of total wage and salary employment in an occupation across the industries surveyed. The OES survey defines employment as the number of workers who can be classified as full- or part-time employees, including workers on paid vacations or other types of paid leave; workers on unpaid short-term absences; salaried officers, executives, and staff

intervals in May and November of each year from 2003 forward. Prior to 2003, the data is only available annually.

20. To derive estimates of wages that are comparable to the occupational break-down for the economy, I use data from the OES reported for "all occupations."[36] In Table 2, I report the mean wages for all occupations and for interpreters and translators from 2002-2005.[37] To derive an estimate for interpreter wages and employment, I use the occupation category "interpreters and translators." This category is defined as individuals who "translate or interpret written, oral, or sign language text into another language for others."[38]

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members of incorporated firms; employees temporarily assigned to other units; and employees for whom the reporting unit is their permanent duty station regardless of whether that unit prepares their paycheck. See http://www.bls.gov/oes/current/oes_tec.htm.

[36] This category is classified as SOC code 00-0000.

[37] Starting in 2002, several major changes were made in the survey procedure, including the frequency of the survey and the industry coding system used.

[38] http://www.bls.gov/oes/current/oes273091.htm.

Growth in Mean Hourly Wages for All Occupations and Interpreters and Translators

2002 - May 2005

Date	Mean Hourly Wage Growth: Interpreters and Translators	Mean Hourly Wage Growth: All Occupations
	(Percent)	(Percent)
(a)	(b)	(c)
2002 - May 2003	2.62 %	1.81 %
May 2003 - May 2004	2.26	2.24
May 2004 - May 2005	4.54	2.30
Overall: 2002 - May 2005	**9.71**	**6.49**

Notes: In November 2002, the Occupational Employment Survey changed from an annual survey of 400,000 establishments to a semiannual survey of 200,000 establishments. The OES survey samples and contacts establishments in May and November of each year and, over 3 years, contacts approximately 1.2 million establishments. The full 3-year sample allows the production of estimates at fine levels of geographic, industrial and occupational detail.
Data used in the 2002 survey were combined with annual data from 1999 - 2001.
In 2002, the occupational coding methods used by the BLS changed from the Standard Industrial Classification System (SIC) to the North American Industry Classification System (NAICS).

Source: Bureau of Labor Statistics, U.S. Department of Labor, Occupational Employment Survey. http://www.bls.gov/oes, accessed August 25, 2006.

21. Table 2 shows point-to-point growth rates in wages for all occupations (column c) and the interpreter and translator occupation classification (column b). I calculate month-to-month growth rates (where possible) to avoid the possibility that seasonal differences in demand contaminate the results.[39] If we simply compare the wage growth between 2002 and May 2005,

[39] After 2002, OES data is provided both in May and November. I have calculated growth rates using May as a base period. Any comparison across different months (i.e. May to November) may be misleading because of the seasonal fluctuations that can occur in the all occupation wage rate category (there does not appear to be a seasonal pattern in the interpreter and translator wage rate measures).

we find that the approximate three-year growth rate in wages for all occupations was 6.49%, compared to 9.71% for interpreters and translators. From 2002-May 2005, the year-to-year growth rate for interpreters and translators has grown faster than that for all occupations in every year.[40] This growth in interpreter and translator wages implies a supply constraint and/or higher demand for workers than in other occupations.

IV. Equilibrium in the Labor Market for VRS Interpreters

22. Given the characteristics of the labor market(s) for VRS interpreters, I now describe the equilibrium in the labor market(s) for VRS interpreters. The demand for VRS, as measured by the number of VRS minutes, has grown steadily over the past few years.[41] As I understand it, the demand for VRS interpreters is expected to continue to increase over the next few years.[42] As I previously stated, since end users of this service do not pay per-minute rates for VRS, price constraints do not limit the demand for minutes of VRS use. Further, the demand for VRS interpreters cannot be separated from the demand for ASL interpreters more generally. According to BLS, the demand for interpreters and translators generally is expected to increase.[43] The overall picture is one of increasing demand over the next few years for VRS interpreters.

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[40] There are limitations to the use of the OES data for time series comparisons, but this is the only available government data providing detailed occupational codes required to identify the interpreter and translator category.

[41] One recent regulatory change that has further increased the demand for VRS interpreters but is not measured by the VRS minutes is the FCC's adoption of speed-of-answer requirements. Sorenson, for example, had to hire more interpreters to handle the same volume of call minutes.

[42] NECA, for example, in a public presentation at the NASRA conference, projected increased growth in the number of VRS minutes would double between 2005 and 2006. http://www.neca.org/media/090805NASRAPRESENTATION.pdf at 19.

[43] For example, the Bureau of Labor Statistics predicts employment growth of about 24 percent for the occupation between 2000 and 2010. See http://www.bls.gov/opub/ooq/2002/summer/art02.pdf at 26.

23. The constraints on the supply side I described above relate to the pool of available and trained interpreters. An important consideration in assessing the equilibrium is the requisite training and lag time required to prepare an individual for VRS interpreting. There are a finite number of individuals coming out of training programs in the United States to meet the increasing demand. These supply factors are important in thinking about the equilibrium in the market(s) for VRS interpreters. The lag time to train new VRS interpreters, the need for flexible work arrangements to attract the pool of trained workers, and the capacity of the existing training programs, are all factors that are likely to create frictions in the labor market that may limit the ability of the supply to keep up with potential growing demand for VRS at current wages.

24. In equilibrium, we expect VRS providers as well as community organizations, educational institutions, and others to compete with each other for the pool of newly available interpreters coming out of educational programs. Available interpreters select jobs based on their own preferences, including the wages offered and other non-pecuniary considerations (such as work conditions, break times, etc.). In recent years, VRS providers have expanded into new geographic locations to find interpreters, incurring increased costs of setting up call centers as well as training costs. This is unlikely to be a viable option for the long run. If demand for VRS interpreters continues to grow while supply remains constant, then for the labor market to equilibrate wages will increase for VRS interpreters and/or firms will be required to invest more heavily in training interpreters.

V. Conclusions

25. Based on my analysis of the matter to date, I have come to the following conclusions:

- The supply of VRS interpreters is limited by the educational requirements, certification requirements, experience, and other skills required to be an effective

interpreter. The long lag time to train new VRS interpreters could create frictions in the labor market that may limit the ability of the supply to keep up with the demand.

- The demand for qualified interpreters is increasing.
    - Demand for VRS is increasing; and
    - Demand for ASL interpreters is not only derived from VRS demand, but also the demand for interpreting services more broadly (which, all else equal, will increase the wages for interpreters).
- Wage growth for interpreters and translators as measured by the BLS has exceeded wage growth for all occupations since 2002. This is consistent with a market in which demand is increasing more rapidly than supply.
- As I understand the likely movements in supply and demand, the long run equilibrium in the labor market(s) for VRS interpreters will likely result in wage increases that will result in increases in the per-minute cost of VRS unless providers take steps to increase the supply of qualified VRS interpreters.

NERA
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Appendix A

JOHN H. JOHNSON, IV
VICE PRESIDENT

Dr. Johnson is a Vice President at NERA who specializes in the economics of labor, antitrust, and intellectual property. He also has expertise in damages estimation and the use of econometric methods in commercial litigation. He has extensive experience with Section I Sherman Act matters, including both criminal and civil cartel and price fixing cases.

Dr. Johnson also specializes in the economics of class certification. He has conducted economic research on both common impact and formulaic approaches to damages in both direct and indirect purchaser litigation. He has significant litigation experience in all phases of class action matters.

In addition, Dr. Johnson has a wide range of commercial damages experience. He has conducted economic research with large transaction and demographic data sets, including volume of commerce calculations, pricing analyses, and econometric damages modeling. His experience includes cases involving retroactive ratemaking and Robinson-Patman violations.

In intellectual property, Dr. Johnson has worked on patent damages litigation, including reasonable royalties calculations. He has also written on the use of event studies in intellectual property and on the current state of empirical analysis in intellectual property. Dr. Johnson also teaches CLE courses on the calculation of damages in patent litigation.

In addition to his litigation experience, Dr. Johnson has worked on a variety of merger and competition policy issues. In particular, his work has involved both coordinated and unilateral effects analyses and has focused on specific competitive issues arising in monopsony markets.

Dr. Johnson earned his PhD in economics from the Massachusetts Institute of Technology. He also earned a BA in economics, with highest distinction, from the University of Rochester. Prior to joining NERA, Dr. Johnson was an Assistant Professor of Economics and Labor and Industrial Relations at the University of Illinois at Urbana-Champaign, where he taught courses in labor economics, with a special focus on discrimination and the role of women in the labor market. His recent papers study the impact of long work hours on divorce and the effects of work hour regulation on public sector labor markets.

Education

Massachusetts Institute of Technology
PhD, Economics, 1999

University of Rochester
BA, *magna cum laude* with Highest Distinction in Economics, 1995

Professional Experience

NERA Economic Consulting

2005-	Vice President
2003-2005	Senior Consultant
2001-2003	Consultant

University of Illinois at Urbana-Champaign

1999-2001	Assistant Professor of Economics and of Labor & Industrial Relations

Professional Activities

Board of Editors, *Economic Approaches to Intellectual Property Policy, Litigation, and Management Issues*, NERA Economics Consulting

Member, American Economic Association

Member, American Bar Association

Journal Referee, *Quarterly Journal of Economics, Journal of Human Resources, Journal of Business and Economic Statistics, Journal of Public Economics, Quarterly Review of Economics and Finance, Journal of Labor Economics, Scandinavian Journal of Economics, Managerial & Decision Economics, University of Illinois Campus Research Board*

Written Testimony and Expert Reports

Expert Report of Dr. John H. Johnson and Dr. Richard T. Rapp in *In Re Polyester Staple Antitrust Litigation.* Western District Court of North Carolina, Charlotte Division. September 8, 2006.

Expert Report of Dr. John H. Johnson in *The Republic of Korea v. SK Corporation, et al.* Seoul Central District Court, May 2006.

Selected Litigation/Consulting Assignments

For North American Bus Industries, Inc., provide consulting services related to Buy America claims.

For Agrium and Pursell Technologies, assist counsel with analysis of competitive impact of merger.

For Smithfield Foods, assist counsel with analysis of competitive impact of the acquisition of Cook's Hams.

For Hughes Network Systems, provide consulting services on antitrust damages related to Robinson-Patman claims.

For International Paper, provide consulting services on economic issues in several antitrust matters.

For Clearplay, Inc., retained by counsel with Dr. Alan Cox to analyze reasonable royalties in patent infringement case.

For JP Morgan Chase, provide consulting services in antitrust matter with respect to gold industry.

For Quantum Corporation, Fuji Photo Film U.S.A., and Maxell-Hitachi Corporation, support declaration of Dr. Richard Rapp in opposition to class certification in litigation involving intellectual property and vertical relationships in the data storage and recovery industry.

For Novus Corporation, provide economic analysis to joint defense group for mediation hearing in direct purchases suits related to *Re: Methionine Antitrust Litigation*.

For Smithfield Farms, assist counsel with economic arguments supporting successful motion for summary judgment in Packers and Stockyards Act class action complaint about purchasing practices with respect to live hogs.

For Smithfield Farms, assist counsel with analyzing the competitive impact of the acquisition of Farmland Industries hog production and processing assets.

For the National Association of Broadcasters, support expert witness testimony of Dr. Gregory Rosston in the Copyright Arbitration Royalty Panel hearing on allocation of distant signal royalties.

For American President Lines and Sealand, support expert witness testimony of Dr. Andrew Joskow before the Federal Maritime Commission in *Government of Guam vs. Sealand and American President Lines.*

For Sanofi, assist counsel in econometric analysis of market definition issues related to anticoagulants.

For Toyota, assist counsel in econometric analysis of automobile accessory pricing.

For Phillips Petroleum and Conoco Petroleum, assist counsel in analyzing the competitive impact of proposed merger on fractionation services and propane.

For Superior Essex, assist counsel in analyzing the competitive impact of Superior Essex's acquisition of Beleden's OSP copper wire and cable assets.

For Chisso, assist counsel in analyzing antitrust issues related to *Sorbates Antitrust Litigation.*

Publications

"Downstream Discovery in Antitrust Class Actions." (with Laila Haider and Ian Simmons). *The Antitrust Practitioner*. July 2006.

"Is the Tide Turning? Economic Analysis of Class Certification." (with Gregory Leonard). June 2006.

"Economic Evidence in Criminal Cartel Cases," *Antitrust Insights*, January/February 2006.

"The Economics of Patent Policy: A Review of Recent Empirical Studies" in *Economic Approaches to Intellectual Property Policy, Litigation, and Management*, ed. Gregory K. Leonard and Lauren J. Stiroh. (New York: National Economic Research Associates, 2005).

"The Use of Event Studies in Intellectual Property Litigation" (with Vinita Juneja) in *Economic Approaches to Intellectual Property Policy, Litigation, and Management*, ed. Gregory K. Leonard and Lauren J. Stiroh. (New York: National Economic Research Associates, 2005).

"Economic Approaches to Antitrust Damages Estimation," *NERA Economic Consulting Working Paper*, January 2005.

"Do Long Work Hours Contribute to Divorce?" *Topics in Economic Analysis & Policy*: Vol. 4: No. 1, Article 24, October 2004.

"The Impact of Federal Overtime Legislation on Public Sector Labor Markets." *Journal of Labor Economics*, January 2003.

"Death by Lethal Injunction: National Emergency Strikes Under the Taft-Hartley Act." (with Michael LeRoy), *Arizona Law Review*, Spring 2001.

"Effects of Work-Related Absences on Families: Evidence from the Gulf War." (with Joshua Angrist), *Industrial and Labor Relations Review*, October 2000.

Presentations

"Statistical Detection of Cheating: The Chicago Black Sox Scandal of 1919" as panelist on Frameworks for Effectively Presenting and Impeaching Cutting Edge Expert Testimony at the Edward Bennett Williams Inns of the Court, Washington, DC, October 19, 2006.

"Cutting Edge Econometrics in Antitrust Class Certification." NERA Antitrust and Trade Regulation Seminar, Santa Fe, NM, July 2006.

"Patent Trolls and Injunctive Relief." NERA Economic Consulting Intellectual Property Practice Presentation. Villard Mansion, New York City, June 2006.

"The Economics of Antitrust Class Certification. Presentation at Cadwalader, Wickersham & Taft, New York City, December 2005; Hogan & Hartson, Washington, DC, January 2006; O'Melveny & Myers, Washington, DC, February 2006.

"The Economics of Reasonable Royalties." Presentation at Hunton & Williams , Washington, DC, November 2005.

"The Role of Economists in Intellectual Property Litigation." Presentation at Hunton & Williams (with George Korenko), Washington, DC, November 2004.

Panelist, *Special Ethics Concerns in Class Actions*. Federal Trade Commission Conference on Protecting Consumer Interests in Class Actions, Washington, DC, September 2004.

"Class Certification: Theory and Practice." NERA Antitrust and Trade Regulation Seminar, Santa Fe, NM, July 2003.

"The Role of Economists in Litigation." CLE Course at Williams and Connolly (with James Jordan), Washington, DC, May 2003.

"The Economics of Antitrust Damage Estimation." Presentation at Wilmer, Cutler and Pickering, Washington, DC, January 2003.

10/30/06

Appendix B

Registry of Interpreters for the Deaf
Interpreter Training Programs

Type of Program	School	City	State
(a)	(b)	(c)	(d)
Certificate	American River College	Sacramento	CA
Certificate	American Sign Language & Interpreting School of Seattle (ASLIS)	Seattle	WA
Certificate	Austin Community College	Austin	TX
Certificate	Burlington County College	Pemberton	NJ
Certificate	CCBC Catonsville	Catonsville	MD
Certificate	Cincinnati State Technical and Community College	Cincinnati	OH
Certificate	Collin County Community College District	Plano	TX
Certificate	Community College of Allegheny County, North Campus	Pittsburgh	PA
Certificate	Cy-Fair College	Cypress	TX
Certificate	Del Mar College - Interpreter for the Deaf Program	Corpus Christi	TX
Certificate	El Paso Community College - Sign Language Interpreter Program	El Paso	TX
Certificate	Georgia Perimeter College	Clarkston	GA
Certificate	Golden West College	Huntington Beach	CA
Certificate	Grant McEwan College - Sign Language Studies Program	Edmonton	Alberta, Canada
Certificate	John A. Logan College	Carterville	IL
Certificate	Kapiolani Community College - ASL Interpreter Education Program	Honolulu	HI
Certificate	LaGuardia Community College via State University of New York	New York City/LIC	NY
Certificate	Lansing Community College	Lansing	MI
Certificate	McLennan Community College	Waco	TX
Certificate	Mount San Antonio College	Walnut	CA
Certificate	New River Community College	Dublin	VA
Certificate	North Harris College	Houston	TX
Certificate	Northcentral Technical College	Wausau	WI
Certificate	Northern Essex Community College	Haverhill	MA
Certificate	Oklahoma State University - OKC	Oklahoma City	OK
Certificate	Oxnard College	Oxnard	CA
Certificate	Palomar Community College	San Marcos	CA
Certificate	Phoenix College	Phoenix	AZ
Certificate	Project TIEM.Online Northeastern University	Boston	MA
Certificate	Riverside Community College	Riverside	CA
Certificate	Saint Paul College - A Community and Technical College	St Paul	MN
Certificate	San Antonio College	San Antonio	TX
Certificate	Seymour Joseph Institute of American Sign Language	Staten Island	NY
Certificate	Sinclair Community College	Dayton	OH
Certificate	St. Clair College (AEIP)	Windsor	ON
Certificate	St. Louis Community College at Florissant Valley	Ferguson	MO
Certificate	Tidewater Community College	Chesapeake	VA
Certificate	Tulsa Community College	Tulsa	OK
Certificate	University of Wisconsin - Milwaukee	Milwaukee	WI
Certificate	Washtenaw Community College	Ann Arbor	MI
Certificate	Waubonsee Community College	Sugar Grove	IL
Certificate	William Rainey Harper College	Palatine	IL
Associate	American River College	Sacramento	CA
Associate	Austin Community College	Austin	TX
Associate	Bethel College - Deaf Studies/Interpreter Training Program	Mishawaka	IN
Associate	Burlington County College	Pemberton	NJ
Associate	CCBC Catonsville	Catonsville	MD
Associate	Central Piedmont Community College	Charlotte	NC
Associate	Chattanooga State Technical Community College	Chattanooga	TN
Associate	Cincinnati State Technical and Community College	Cincinnati	OH
Associate	Collin County Community College District	Plano	TX
Associate	Columbus State Community College	Columbus	OH
Associate	Community College of Allegheny County, North Campus	Pittsburgh	PA
Associate	Community College of Southern Nevada	N Las Vegas	NV
Associate	Corning Community College	Corning	NY
Associate	Cuyahoga Community College, Western Campus	Parma	OH
Associate	Cy-Fair College	Cypress	TX
Associate	Daytona Beach Community College	Daytona Beach	FL
Associate	Del Mar College - Interpreter for the Deaf Program	Corpus Christi	TX

Registry of Interpreters for the Deaf
Interpreter Training Programs

Type of Program (a)	School (b)	City (c)	State (d)
Associate	Douglas College	New Westminister	BC
Associate	El Paso Community College - Sign Language Interpreter Program	El Paso	TX
Associate	Fairmont State Community and Technical College Interpreter Training Program	Fairmont	WV
Associate	Florida Community College at Jacksonville	Jacksonville	FL
Associate	Fox Valley Technical College	Appleton	WI
Associate	Front Range Community College	Westminster	CO
Associate	Georgia Perimeter College	Clarkston	GA
Associate	Golden West College	Huntington Beach	CA
Associate	Hillsborough Community College	Tampa	FL
Associate	Idaho State University	Pocatello	ID
Associate	Iowa Western Community College	Council Bluffs	IA
Associate	John A. Logan College	Carterville	IL
Associate	Johnson County Community College	Overland Park	KS
Associate	Kapiolani Community College - ASL Interpreter Education Program	Honolulu	HI
Associate	Kirkwood Community College	Cedar Rapids	IA
Associate	Lansing Community College	Lansing	MI
Associate	Maple Woods Community College	Kansas City	MO
Associate	McLennan Community College	Waco	TX
Associate	Miami - Dade Community College	Miami	FL
Associate	Milwaukee Area Technical College	Milwaukee	WI
Associate	Mott Community College	Flint	MI
Associate	Mount Aloysius College	Cresson	PA
Associate	Mount San Antonio College	Walnut	CA
Associate	Nashville State Technical Institute	Nashville	TN
Associate	National Technical Institute for the Deaf (NTID)	Rochester	NY
Associate	New River Community College	Dublin	VA
Associate	North Harris College	Houston	TX
Associate	Northcentral Technical College	Wausau	WI
Associate	Northern Essex Community College	Haverhill	MA
Associate	Northern Virginia Community College	Annandale	VA
Associate	Northwestern Connecticut Community College	Winsted	CT
Associate	Nova Scotia Community College	Halifax	NS
Associate	Oklahoma State University - OKC	Oklahoma City	OK
Associate	Oxnard College	Oxnard	CA
Associate	Palomar Community College	San Marcos	CA
Associate	Phoenix College	Phoenix	AZ
Associate	Pikes Peak Community College	Colorado Springs	CO
Associate	Pima Community College	Tucson	AZ
Associate	Riverside Community College	Riverside	CA
Associate	Saint Paul College - A Community and Technical College	St Paul	MN
Associate	Salt Lake Community College - Department of ASL/Interpreting	Salt Lake City	UT
Associate	San Antonio College	San Antonio	TX
Associate	Seattle Central Community College	Seattle	WA
Associate	Sinclair Community College	Dayton	OH
Associate	Southeast Technical Institute	Sioux Falls	SD
Associate	Southwest Collegiate Institute for the Deaf	Big Spring	TX
Associate	Spartanburg Technical College	Spartanburg	SC
Associate	St. Louis Community College at Florissant Valley	Ferguson	MO
Associate	St. Petersburg College	Clearwater	FL
Associate	Suffolk Community College	Selden	NY
Associate	Tennessee Temple University	Chattanooga	TN
Associate	Tidewater Community College	Chesapeake	VA
Associate	Tulsa Community College	Tulsa	OK
Associate	Union County College	Cranford	NJ
Associate	University of Arkansas at Little Rock	Little Rock	AR
Associate	Waubonsee Community College	Sugar Grove	IL
Associate	Wilson Technical Community College Interpreter Education Program	Wilson	NC
Bachelor	Augustana College	Sioux Falls	SD
Bachelor	Bethel College - Deaf Studies/Interpreter Training Program	Mishawaka	IN
Bachelor	Bloomsburg University	Bloomsburg	PA
Bachelor	California State University at Northridge	Northridge	CA
Bachelor	California State University Fresno	Fresno	CA

Registry of Interpreters for the Deaf
Interpreter Training Programs

Type of Program (a)	School (b)	City (c)	State (d)
Bachelor	College of St. Catherine	Minneapolis	MN
Bachelor	Columbia College Chicago	Chicago	IL
Bachelor	Eastern Kentucky University	Richmond	KY
Bachelor	Gardner Webb University	Boiling Springs	NC
Bachelor	Goshen College	Goshen	IN
Bachelor	Idaho State University	Pocatello	ID
Bachelor	Indiana University Purdue University Indianapolis (IUPUI)	Indianapolis	IN
Bachelor	Kent State University	Kent	OH
Bachelor	LaGuardia Community College via State University of New York	New York City/LIC	NY
Bachelor	Maryville College	Maryville	TN
Bachelor	Mount Aloysius College	Cresson	PA
Bachelor	National Technical Institute for the Deaf (NTID)	Rochester	NY
Bachelor	North Central University	Minneapolis	MN
Bachelor	Northeastern University	Boston	MA
Bachelor	Quincy University	Quincy	IL
Bachelor	Seymour Joseph Institute of American Sign Language	Staten Island	NY
Bachelor	Tennessee Temple University	Chattanooga	TN
Bachelor	University of Arizona - Interpreter Training Program	Tucson	AZ
Bachelor	University of Arkansas at Little Rock	Little Rock	AR
Bachelor	University of New Hampshire	Manchester	NH
Bachelor	University of New Mexico	Albuquerque	NM
Bachelor	University of North Carolina - Greensboro - Interpreter Training Program	Greensboro	NC
Bachelor	University of South Florida	Tampa	FL
Bachelor	University of Southern Maine	Portland	ME
Bachelor	University of Tennessee	Knoxville	TN
Bachelor	University of Wisconsin - Milwaukee	Milwaukee	WI
Bachelor	Western Regional Interpreter Education	Monmouth	OR
Bachelor	William Woods University	Fulton	MO
Graduate	Gallaudet University	Washington	DC
Graduate	Indiana University Purdue University Indianapolis (IUPUI)	Indianapolis	IN
Graduate	Kent State University	Kent	OH
Distance	John A. Logan College	Carterville	IL
Distance	Northcentral Technical College	Wausau	WI
Distance	Project TIEM.Online Northeastern University	Boston	MA
Distance	Spartanburg Technical College	Spartanburg	SC
Distance	University of Tennessee	Knoxville	TN
Distance	Waubonsee Community College	Sugar Grove	IL

Source: Registry of Interpreters for the Deaf Interpreter Training Programs Database, *http://filemaker.rid.org/FMPro?-db=Interpreter Training Program_agencies .fp3&-lay=web&-format=Interpreter Training Program_search.htm&-view.*