D-1. Telecommunications System Plan & Scope of Work

Telecommunications System Plan:

The New Connections for Community Mental Health Proposal is a telemedicine program to provide services to people statewide in Minnesota.

1. New Connections will provide virtual presence communication-based (videoconferencing) services at 80 community mental health facilities throughout Minnesota for people needing access to mental health services. Equipment funded by USDA's Telemedicine program will be located in existing client service buildings. All mental health facilities will be interconnected with each other on a statewide broadband network with further interconnection capabilities to other health care consumer and provider organizations on the same network as well as on separate accessible networks.

2. Following is a map showing the locations of the community mental health facilities which are members of the Minnesota Association for Community Mental health Programs, Inc., the applicant for the USDA RUS grant. This map, entitled "Leveraging Mental Health Leadership for Tele-Health Broadband Development in Minnesota," also shows the relationship of community clinics in northeastern Minnesota to the supervising mental health center in Duluth.

A second map, entitled "Network Service Provider Major Trunks Providing Broadband Statewide" shows the locations of targeted community telemedicine facilities in relationship to the major broadband trunks operated by network service providers eligible to competitively bid on the provision of telecommunications services required for the New Connections Tele-Mental Health network.

A following diagram, "Facility Network and Endpoint Hardware," shows the interface between end-point videoconferencing equipment and the router provisioned by the network service provider on the community mental health facility premises.

3. The specific videoconferencing equipment selected for use by the New Connections Program is the Polycom VSX 7000 system. This product has been tested and certified for use on numerous public and private networks in Minnesota as well as tested in one of the Mn. Association of Community Mental Health Center Pilot Projects. Other Polycom products have been in use in Association Pilot Projects from 2002 – 2005. These include Polycom FX's, VS-4000's, ViewStation MP's.

This end-point (Polycom) equipment will be connected as shown in the diagram in number 2 above, "Facility Network and Endpoint Hardware," to the network and router provided and provisioned by the network service provider.

Television display devices will be provided by the Mental Health Centers participating in the New Connections Program and will be sized and mounted appropriate to the physical space – office, patient examining room, task room – designated at each facility. The minimum size

and standard for the consultation applications planned will be a 27 inch television with performance capabilities in terms of video and audio quality equal to or exceeding the:

Sony 27 inch FD Trinitron WEGA Flat-Screen TV with SRS Audio Effect/Steady Sound
Model KV27FS120 (or equal)

This product has been used extensively in videoconferencing production settings, including psychiatric consultations, at pilot project sites associated with the New Connections Program. It has been found to be reliable and to provide the required quality of video and audio when used in tandem with the Polycom FX and VSX generations of set-top and integrator products.

Procurement of end-point equipment will be accomplished by competitive procurement through a bidding process to which all qualified vendors will be invited. Qualified vendors will need to be manufacturer certified to provide installation and maintenance services and with qualified personnel available in Minnesota to assure prompt technical support to the field installations located throughout the State. A help-desk will also be required. Several companies exist to meet these standards:

AVI Systems, Eden Prairie, MN
Comp View, St. Paul, MN
M:Space, Minneapolis, MN
Video Guidance, Eden Prairie, MN

4. Capabilities of the telecommunications terminal equipment that will deliver services include the following requirements. These are based on consultations and actual product evaluations and usage by psychiatrists in different organizations and healthcare systems:

Design and usability characteristics:

- Set-top design: Suitability, versatility, and adaptability of design for installation with a variety of display sizes and types and for quick installation and deinstallation.
- Easy user interface: Remote control and software interface suitable for easy learning and use by frequent and occasional users.
- High quality audio & video: Suitable to psychiatric consultation standard of performance as determined by psychiatrists which have advised New Connections Program planners.
- Camera functionalities: Pan, tilt, zoom, auto iris, auto focus, auto white balance, adaptability to varying lighting conditions and color environments, remote control of "far-end" camera (standards based). Optional second camera inputs
- Audio functionalities: Easy control of audio levels and muting, Control options for auto muting to assure privacy/confidentiality. Full-duplex audio and instant echo cancellation with option to turn off echo cancellation. Both mic & line-level inputs
- Video functionalities: NTSC, XGA, SVGA, VGA. S-Video out to main monitor
- Encryption of transmission for compliance with Federal HIPAA requirements.
- Multipoint conference creation up to four locations through internal MCU including option to display continuous presence of all participating locations.
- Remote control and management for remote operational problem solving and maintenance.

- Full compatibility with Industry standard bridges/MCU's by manufacturers to include Accord and Tandberg.

Technical Specifications:

- Compression standards: ITU H.323 and H.320 compliant with video standards inclusive of H.264.
- Bandwidth capabilities: IP up to 2 Mbps; ISDN up to 2 Mbps.
- Video frame rates: 30 fps.
- Additional standards as included in the Polycom VSX 7000 base unit represent a baseline of technical requirements which must be present on an equal to or exceeds basis. Detailed product specifications for the VSX 7000 follow.

Discussions with Technical Sources:

Investigations of end-point and network technical alternatives and solutions has been extensive.

Existing videoconferencing operations either in full, established production and pilot projects of various durations from six months to three years.

- Extensive planning and consultation discussions occurred with management, engineering, and operational personnel at the Minnesota Department of Human Services which operates 70 videoconferencing sites in Minnesota State Office Buildings in the St. Paul area and several large campus-based locations in Minnesota. All sites operate Polycom videoconferencing systems acquired from 1999 – 2004 on networks including ISDN, fractional T, and IP and including Models FX, VS-4000, and testing of VSX models.

- Consultations occurred with pilot project managers, users, and technical staff at these sites:

    A. Blue Cross and Blue Shield Minnesota, Eagan, operating Polycom VS 4000 equipment
    B. Human Development Center, Duluth, operating Polycom FX equipment
    C. Southwest Mental Health Center, Luverne, operating Polycom VSX 7000 equipment in cooperation with Avera-McKennan hospitals in South Dakota.
    D. Upper Mississippi Mental Health Center, Bemidji & Park Rapids operating Polycom FX equipment
    E. Western Mental Health Center, Marshall, operating Polycom VSX 7000 equipment.
    F. Mn. Association of Community Mental Health Programs' Task Force on Tele-Mental Health using county and State and school facilities operating Polycom FX, VS-4000, and VSX 7000 and Tandberg MXP 880 and MXP 2500 equipment.

- Consultations occurred with organizations owning and operating videoconferencing equipment actively in use on networks to discuss their operational experience, product experience, operational policies and issues, and to opportunities for cooperation.

    A. Allina Health Systems, Minneapolis.
    B. Fairview – University of Minnesota Telemedicine Project, St. Paul
    C. Veteran's Administration Midwest Health Care Network, Minneapolis.
    D. Affiliated Community Medical Centers, Willmar.
    E. SISU Medical Systems Network, Duluth.
    F. Minnesota Department of Health, St. Paul.
    G. Avera-McKennan Hospitals, Sioux Falls, S.D.

- Product vendor consultations occurred with sales, engineering, and technical personnel at the following companies to investigate products, products in the pipeline, sales and reliability patterns, service response times, and pricing:

    A. M:Space, Polycom & Tandberg Dealer, Minneapolis, MN
    B. Video Guidance, Polycom, Tandberg, & Sony Dealer, Eden Prairie, MN.
    C. SKC, Polycom & Tandberg Dealer, Shawnee-Mission, Ks.
    D. Polycom Corporate, Chicago & Detroit.
    E. Sony Corporate, Minneapolis.
    F. Tandberg Corporate, Minneapolis, Washington, D.C., Boston.

Cost estimates for operating and maintaining the end-user equipment:

Three models for operation and maintenance of end-user equipment have been examined.

The first is for each end-point videoconferencing system to be on an individual and separate maintenance contract. Dealer-based equipment maintenance contracts are available on a discounted volume contract in Minnesota through a factory-authorized dealer on a per-system basis at $700 per year based on a one-hour response time on calls placed to the help desk and on-site service within four hours during regular Monday-Friday business hours. Optional after-hour maintenance is available. This pricing is suitable for budgetary estimating. Under this model, the annual cost of maintenance contracts for 80 systems would be $56000.

Because the New Connections Program will issue a request for bids on videoconferencing equipment, the terms for maintenance requirements can be redefined in the bid process. This leads to the second model.

The second model is based on centralized management of all equipment at all sites and the use of spare systems owned by the New Connections Program for immediate replacement shipment to any site experiencing an equipment malfunction thereby enabling the malfunctioning unit to be repaired or replaced. An annual maintenance cost of $56000 is equal to the purchase of seven Polycom VSX 7000 systems in one year. Planning consultations with other organizations which own large numbers of Polycom systems indicate that the risk of non-repairable system failure will be no more than two or three per 100 systems – or less than half the cost of individual annual maintenance contracts. Handling remote diagnostics of end-point equipment from a central point would free all clinics from the

responsibility and expense of local or area-wide, in-house technical support. Personnel costs associated with the remote diagnostics process and spare-system model of maintenance can be handled within the New Connections Program, outsourced, or partnered, which leads to the third model.

The third model is based on entering into a partnered, or cooperative agreement with one or more organizations which own and operate a large volume of the same equipment and wish to pool the risk of hardware failure and centralize technical support and maintenance with the New Connections Program. The Office of Tele-Community Development at the Minnesota Department of Human Services is a candidate for this cooperative agreement and will work with the New Connections Program to pool all maintenance requirements and jointly negotiate the most cost-beneficial arrangement for centralized support provided in-house, or outsourced. Under this model the costs of maintenance for a large pool of systems can be reduced to fifty percent of the cost of individual annual maintenance contracts for each site. Discussions are taking place with equipment vendors and manufacturers to determine if codec software upgrades can be purchased on a bulk discounted basis as part of a centralized program of system maintenance and support. The answer is not known at the time of this grant submittal.

Provide Evidence of Evaluation of Alternative Equipment & Technologies:

Evidence of this exists in the sections documented above dealing with discussions with vendors and organizations operating virtual presence communication technologies in health care and related fields.

Further evidence consists of specific testing and evaluation of new videoconferencing systems that have emerged in the past twelve months. These products have been acquired from manufacturers and dealers for testing and evaluation in the past six months. Tests have been performed by attaching systems to existing networks in operation with organizations which are assisting the New Connections Program developers. Equipment tested includes the following products – all of which were evaluated for their potential use in private offices and patient examining rooms with LCS or plasma flat-panel displays for the space-saving advantages this might have. None of these products met the application requirements defined above – including affordability:

Polycom VSX 3000 LCD-TV-based tabletop system supplied for testing by a dealer.
Sony PCSTL50 LCD-TV-based tabletop system supplied by SONY Corporate.
Sony PSC1S – small integrator system supplied by SONY Corporate.
Tandberg 1500 MXP – LCD-TV-based tabletop unit supplied by Tandberg Corporate
Tandberg 2000 MXP – LCD-TV-based floor standing unit supplied by Tandberg Corp.
Tandberg 3000 MXP – small integrator system supplied by Tandberg Corporate.
Tandberg 6000 MXP – large integrator system supplied by Tandberg Corporate.

Advice was obtained from a large number of psychiatrists and physicians who participated in testing videoconferencing systems for use in direct client consultations. They were asked about the functionality requirements of videoconferencing equipment, quality of audio and video, size of display, and usability characteristics. This is considered the most important single source of information regarding equipment requirements and network performance

requirements. Their recommendations have been integrated into the technology specifications of this proposal.

5. Will the project duplicate any adequate, established telemedicine services?

No. There is no program of mental health services being provided by telemedicine beyond very small-scale pilot projects being conducted under the auspices of the Minnesota Association of Community Mental Health Programs, Inc., (author of this proposal) and affiliated organizations identified under Section 4 above.

New Connections for Community Mental Health, sponsored by the Association represents the vision and plans of the only statewide network of mental health service providers in Minnesota. The Association and the New Connections Program are based on a commitment by this statewide leadership group to include and connect with all mental health and healthcare organizations in Minnesota, as well as bordering states, in order that a highly connected network of telemedicine services come into being in order to provide the benefits to rural communities throughout the region. The foundation stones for this are **inclusion, connectedness, innovation, and sustainability.**

6. Consultations with appropriate telecommunication carriers:

Planning discussions have occurred with carriers at the local, regional, statewide, and interstate level to assess and assure the technical and economic feasibility of the statewide telemedicine initiative for which this proposal represents the first phase. There are major trunk networks in place in Minnesota's telecommunications industry suitable and available to implement what is proposed in this New Connections proposal to USDA. There are at least two private sector primary telecommunication groups in Minnesota which have qualifying experience plus infrastructure to support the statewide, 24 x 7, videoconferencing-intensive applications and facility interconnections set forth in this proposal. Both of these have several years of experience providing network services to support videoconferencing.

ONVOY in Minneapolis, MN, operating a statewide backbone network which includes broadband video services.

AURORA in Moorhead, MN representing a statewide backbone network managed by independent telephone companies. 702 Communications of Moorhead, Mn is an agent for the AURORA network.

Information gathering discussions as well as pilot projects have occurred with both of these groups to verify that the statewide telemedicine vision of the Minnesota Association of Community Mental Health Programs, Inc. can become a reality and to become familiar with the capabilities of each group.

Four of six pilot projects involving the New Connections Program have used and tested network services provided by ONVOY:

Human Development Center Pilot Project using ONVOY's IP Video, Duluth, MN.

Blue Cross Blue Shield Pilot Project using ONVOY's ISDN video to test ISDN to IP to numerous sites and networks, Eagan, MN.

Southwestern Mental Health Center's Pilot Project using ONVOY's gateway services to link the Avera-McKennan Telehealth Network in Sioux Falls, S.D. to Minnesota's government network, MNet in St. Paul.

Mn. Assoc. of Community Mental Health Program's Tele-Mental Health Task Force Pilot Project meeting weekly via videoconferences using ONVOY's IP network, ISDN links, bridging services and gateway services to evaluate diverse site and network interconnections.

A pilot project with 702 Communications/AURORA tested and evaluated the use of non-standard DSL links to provide secure videoconference transmission to group homes in rural Northwestern Minnesota Communities. Specially configured DSL was used as the first mile connection to the AURORA backbone network between and among five locations to determine is this is a solution to broadband connectivity for home tele-healthcare and private physician office locations at less than T1 connectivity. In addition to 702 Communications as a regional carrier, this project included two local carriers: Park Region Telephone Company in Fergus Falls and Arvig Communications in Perham.

The consultations with telecommunications carriers have been extensive – over a three-year period, substantive, and have led to actual pilot project activities with live videoconferencing occurring. As a result, New Connections Program planners have a clear idea about what telecommunication services will be required, who will need to be involved, how business agreements will need to be constructed, what the costs will be, and what unresolved issues will require attention.

The New Connections Program will publish a request for bids to formally solicit proposals for services, consistent with policy requirements under the U.S. universal service program and U.S. HIPAA. The request will be for a full spectrum of telecommunications network services based on quality-of-service IP tailored specifically to videoconferencing applications in a health care environment, 24 x 7. Included will be value added services such as high capacity bridging, remote access to bridge scheduling processes, gateway interconnections to other networks, help desk services, backup systems and processes to assure reliability. The request for proposals will also address the issue of secure, first-mile connectivity solutions to enable home tele-healthcare services.