

regulatory arenas, with its agenda designed to improve access to quality, cost-effective health care services.

- The California Health Foundation and Trust (CHFT) is a 501(c) (3) non-profit corporation established in 1956 to sponsor and support health care access, research and education. CHFT is affiliated with the California Hospital Association. Both CHFT, which houses the California Telemedicine and eHealth Center (CTEC) and CHA are committed to continuing and expanding the telemedicine and eHealth programs serving rural underserved populations. CHA, through its Rural Healthcare Center, facilitates the active inclusion, participation and contribution of California's rural and underserved hospitals in the continued development and expansion of a statewide network for telemedicine and eHealth activities.
- The California Telemedicine & eHealth Center (CTEC) is dedicated to improving health care for underserved communities through the use of innovative technologies. Funded through grants from The California Endowment, the California HealthCare Foundation, Blue Shield of California Foundation, and the Office for the Advancement of Telehealth/HRSA, CTEC has supported a variety of eHealth programs and networks statewide and maintains a resource center that provides training and technical assistance to promote eHealth capacity and competence among providers. Since its inception in 1997, CTEC has facilitated the growth of telemedicine and eHealth in California by working collaboratively with hospitals, clinics, government agencies, legislative policy makers, and other stakeholders. In support of this application, CTEC brings in-depth knowledge of the current status of telemedicine and eHealth activities in rural California, and operational and technical expertise on best practices for establishing and sustaining networks.

The California State Rural Health Association (CSRHA) is a non-profit, nonpartisan, grassroots organization that works to improve the health of rural Californians and the quality and accessibility of the health care they receive. CSRHA brings together health care providers, consumers, educators, researchers, public health and economic development agencies and others to work on issues related to preserving and enhancing the health of rural California. CSRHA will participate in the FCC Rural Health Pilot Project by continuing to provide a voice for rural communities and health care providers at the statewide level. The association is committed to serving the project not only as a resource for rural information and access to rural providers, but as a partner dedicated to advancing the health status of rural residents.

If funded, CSRHA plans to remain engaged in the Rural Health Pilot Project network planning and implementation process. CSRHA will continue to facilitate discussions with a wider variety of rural health stakeholders through the association's Rural Technology Advisory Committee (RTAC). These ongoing discussions will provide a natural venue for communication between the project managing agency (UC) and beneficiaries of the project (i.e., rural clinics, hospitals and health networks).

The California Primary Care Association (CPCA) represents more than 600 not-for-profit community clinics and health centers in California who provide comprehensive health care services to primarily low income, uninsured and underserved Californians. CPCA leads and coordinates efforts of individual clinics and networks of clinics (consortia) to address access barriers through tailored programs and delivery systems that offer culturally appropriate, high quality, primary and preventive health services. CPCA recognizes that telemedicine, particularly in California's rural areas, is a key delivery system that must be expanded and supported to provide timely and cost-effective care to rural, underserved California residents.

## 9. Project Management Plan

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### Leadership and Management Structure

UC will serve as the managing entity for the project, and will determine the legal responsibilities of vendors, stakeholders, and other organizations committing to financial responsibility and additional support of the Network. UCDHS will oversee the technical deployment and administrative aspects of the Network.

As the fiscal intermediary and project manager for the partnership, UCOP and UCDHS will utilize a proactive approach to assure success of the program by using its expertise to oversee and conduct activities supported by the funds, including:

- Managing grant funds with dedicated, professional experts who have significant experience in the areas of grants management, contract oversight, coordination of effort by public and private partners, as well as the technical and clinical aspects of health IT project design and implementation;
- Defining overall network requirements and purchasing equipment based on the types of telehealth applications that the network will have to support;
- Managing contracts with telecommunication companies to construct and provide services to the network;
- Developing contracts with project partners and distributing funds to appropriate parties and vendors to fulfill the obligation of the grant, including subcontracts;
- Managing FCC reporting and compliance;
- Managing Universal Services reimbursement processes;
- Developing and managing the Program Advisory Board;
- Training of remote staff: and
- Providing technical support including site assessments, installations, and feedback mechanisms, leveraging years of combined experience at developing and supporting telemedicine programs in a wide range of specialties and environments.

### California Telehealth Network Program Advisory Board

**Role and Responsibilities.** The overall role and responsibility of the California Telehealth Network Program Advisory Board (Advisory Board) for the FCC Rural Health Care Pilot Program Grant is to advise the University of California Office of the President and the UC Davis Health System (Project Leaders) on

the development, management and implementation of the pilot project. Areas of responsibility will include:

#### Policy and *Programmatic* Guidance

- Establishment of a process and mechanism for ongoing consultation with and input from health care providers in the pilot project, including the sharing of lessons learned;
- Establishment of a process and mechanism to identify specific telehealth and telemedicine services to be provided and to recommend adoption of protocols for delivery of services (as needed);
- Development and approval of methods for monitoring and evaluating the effects of telehealth and telemedicine services on patients and health care delivery systems;
- Modification and revision to the **service** protocols, requisite broadband connections and telemedicine equipment as needed to improve patient outcomes based on evaluation results;
- Facilitation of a productive working relationship with stakeholders;
- Identification and recruitment of additional project partners and new network subscribers; and
- Implementation of the pilot program and assurance of compliance with the requirements and conditions of the FCC grant.

#### Technical Guidance

- Identification and specification of the requisite broadband connections for the pilot and identification and specification of the requisite equipment for telehealth and telemedicine services; and
- Development and oversight of a process for inviting competitive bids for connections between the backbone and the rural clinics and hospitals.

#### *Financial/Business* Guidance and Oversight

- Provision of guidance and assistance in securing funding for approved activities and needed investments for the project, including requisite equipment for telehealth and telemedicine services; and
- Development of a business model for sustainability of the system.

Composition. It is recognized that the University of California, as the fiscal agent and managing partner, is accountable and responsible to the UC Board of Regents. Thus, while the Advisory Board is clearly an advisory body to UC, it is intended to be an actively engaged stakeholder group that works directly and collaboratively with UC on all aspects of the project. Advisory Board members are expected to provide the assistance and guidance necessary to ensure successful implementation of the project. Members of the Advisory Board are encouraged and expected to share ownership for both the success and any failures of the pilot project. The Advisory Board will consist of individuals representing a defined number of agencies

and organizations who have an investment or fiduciary responsibility in the implementation of the project. The following is the recommended composition:

#### *Co-Chairs* and Staff

- UCOP and UCDHS (2)

#### State Agencies and *Investors*

- California Health and Human Services Agency (1)
- California Business, Transportation and Housing Agency (1)
- California Department of Managed Health Care (1)
- California Public Utilities Commission (1)
- California Emerging Technology Fund (1)

#### Provider Groups

- California Telemedicine Network Directors (or designees) (3)

#### Associations

- California Hospital Association/California Telemedicine & eHealth Center (1)
- California State Rural Health Association (1)
- California Primary Care Association (1)

#### Technical Experts

- Cal IT2 - California Institute for Telecommunications and Information Technology (1)
- Other technical expert TBD (1)

The Program Advisory Board will also consider appointment of several workgroups to support its efforts and bring added expertise to issues such as technical and operations security issues; advanced technology and research; finance and sustainability; emergency response and disaster recovery; and provider issues.

## Principal Partners and Roles

A core strength of the proposed California Telehealth Network is the partnerships established for leadership and management of the project. Following are a listing of partners and their roles:

### Health Care Providers:

The University of California System (UC). The University of California, governed by a 26-member Board of Regents, will be legally and financially responsible for the implementation of the activities proposed in this application. The University of California Office of the President (UCOP) and the UC Davis Health System (UCDHS) will share responsibility for the management of the project and the development of the proposed new statewide network. The UC Office of the President, located in Oakland, California, will manage the overall grant, provide all information required by the FCC as part of the grant, and facilitate the activities of partnering organizations and entities as outlined in the application. The UCDHS will serve as the technical network lead and provide the expertise necessary for assuring the successful development of new telemedicine programs statewide.

The UC Office of the President oversees and supports the activities of the 10-campus system, including undergraduate and graduate academic affairs, state and federal governmental relations, state and federal budget matters, legal issues, health sciences and clinical activities, and the overall business and financial affairs of the system. The Office of the President manages the three national labs and oversees statewide agricultural and natural resources services based in all of California's 58 counties. The UC system also operates the largest health sciences instructional program in the nation, annually enrolling more than 13,000 students in fifteen schools located on seven campuses. These programs generate more than one billion dollars annually in research funding. UC's five academic medical centers support the clinical teaching programs of the system's health sciences schools, managing more than 138,000 inpatient discharges, 261,000 emergency room visits and over 3.6 million outpatient visits each year. UC is statutorily designated as California's research university and has a long history of accountability and responsibility for management of complex systemwide and statewide initiatives. The University's total General Fund (state-funded) budget for operations in 2006-07 is more than \$3.6 billion.

The UC Davis Health System will serve as the lead technical entity and coordinate the network. UCDHS has extensive experience in telehealth and continues to receive national recognition for the breadth, depth, and quality of its programs. In 2006, UCDHS's Center for Health and Technology was awarded the American Telemedicine Association President's Award for their advancement of telemedicine; breadth of telemedicine services; and effectiveness at improving the health care of rural Californians. The UCDHS Telemedicine Program provides direct clinical care to patients at a distance through a variety of innovative telemedicine applications, including video-based consultations, emergency room and intensive care unit consultation, video interpreting, quality assurance for sexual assault exams, telepharmacy, home telehealth, and store-and-forward services such as pediatric telecardiology and teleradiology. Consultation services are available in more than forty specialty services serving more than 125 sites, approximately 85 of which are located in, or provide services to, rural areas.

- The Corporation for Education Network Initiatives in California (CENIC), a 501(c)(3), non-profit entity which includes representatives from public and private higher education entities and the K-12 education community in California. CENIC designs, implements, and operates the California Research and Education Network (CalREN), a high-bandwidth, high-capacity network specifically designed to meet the requirements of these academic communities. CalREN consists of a fiber backbone ring that connects California's K-12 education sites, college and university campuses, and the UC, USC and Stanford medical centers via a combination of fiber and more than 200 telecom circuits. The CalREN backbone is connected to Internet2 and National LambdaRail.

Rural health networks and coalitions. A number of existing California telehealth networks and coalitions (and their provider sites) provide primary care and other clinical services to their communities.

- The Northern Sierra Telehealth Network is an existing telehealth network that supports 29 rural and safety-net providers with a variety of telehealth activities. Since 1999, the network has been operated by Northern Sierra Rural Health Network (NSRHN), which is a non-profit corporation whose members include more than 40 rural clinics, rural hospitals, public health departments and other providers. NSRHN serves the nine rural counties of Nevada, Plumas, Sierra, Lassen, Modoc, Siskiyou, Trinity, Shasta and Tehama. Among the distinguishing characteristics of these regions is the lack of community, technology and social-service resources, and isolation from other communities in the region. NSRHN members have conducted more than 4,400 clinical telehealth consultations and over 1,100 distance learning, continuing medical education and other telehealth events.

The network has developed a successful model for serving many communities in the service area by aggregating the needs of patients and providers, acquiring resources on behalf of the aggregated membership, and managing these resources on a regional basis. Used successfully for more than ten years, this approach provides economies of scale and efficient use of resources, and brings new technologies to isolated providers who would be otherwise unable to afford and/or access them.

- The Community Clinics Health Network (CCHN) is a 501(c)(3), non-profit subsidiary of the Council of Community Clinics, founded in 1993 to provide managed care contracting and management support to San Diego's community health centers. CCHN enhances quality of care, improves population health outcomes and strengthens business efficiencies by offering specialized programs, services and technical expertise to more than 30 community clinics and health organizations.

CCHN provides technical expertise in quality and operational management and managed care support including contracting, utilization review and credentialing. CCHN also provides quality improvement and disease management services to participating community health centers. CCHN manages a comprehensive videoconferencing/ telemedicine network that span San Diego, Imperial and Riverside Counties, currently with a project extending telemedicine services to eleven remote community clinics in three counties to ensure that residents have access to clinical and specialty services not available in their local community, as well as to bring educational resources and training to rural health care providers. The CCHN videoconferencing system provides clinical and specialty care through direct telemedicine (provider to patient) and indirect telemedicine (provider to provider) and supports eHealth education for mental health providers.

- Central Valley Health Network (CVHN) consists of thirteen community health center organizations with over one hundred clinical sites in California's "Central Valley." CVHN's service area is approximately 22,500 square miles. In 2006, CVHN health centers served approximately 529,000 patients and had over 2.1 million visits. Member organizations have had some experience with telemedicine, but it is not yet in wide or frequent use. The CVHN intends to leverage its nascent videoconference network to develop a centrally-administered telemedicine program and to expand that program to as many of its 100-plus sites as possible over the next two years.
- The Southern Sierra Telehealth Network (SSTN) was established in 2000 with a grant from the California Telemedicine and e-Health Center (CTEC) (formerly the California Telemedicine and Telehealth Center). The network conducted its first telemedicine consult in 2001 – with this number growing to a total of 1,236 interactive video consultations in 2006. Clinical services include adult psychiatry, pediatric psychiatry, geriatric psychiatry, cardiology, medicine, developmentally disabled services, dermatology, ophthalmology, and other services as needed. Most services are interactive video, store-and-forward dermatology services are also offered. The SSTN network is connected to teaching hospitals, non-teaching facilities, and other consultant groups throughout Southern California, as well as with individual consultant providers from San Francisco to Orange County. Direct connections with other sites have also been supported (including Catalina Island Medical Center, Tehachapi Medical Clinic, Toiyabe Indian Health Project). The network is developing HDV applications, which have proven to be superior to standard video for clinical decision-making in telepsychiatry and other applications.

- Open Door Health **Network/Open** Door Community Health Center (ODCHC) was founded in 1971 to provide health services and preventive health education to residents of Humboldt and Del Norte Counties and to surrounding rural areas of northwestern California. Over the past 36 years, ODCHC has grown from a single storefront site to ten clinics and one mobile dental unit. The Open Door Community Health Center provides services to everyone, regardless of the ability to pay or immigration status. Each year, the center provides over 130,000 medical, dental and mental health visits to 33,000 individuals – or nearly one quarter of the primary care services delivered in the same area. Patients include the uninsured, the homeless, seasonal farm-workers, individuals on Medicaid and Medicare, as well as those with private insurance.

The North Coast **TeleMed** Network, operated by the ODCHC, provides specialty care through the use of technology that links rural California clinics to a hub site where medical specialists provide consultations. Some clinics now use telemedicine to link to providers in large urban tertiary care centers. The North Coast **TeleMed** Network is unique in that its telemedicine hub is based at the Telehealth and Visiting Specialist Center (TVSC) in Eureka, a small rural town in Humboldt County. Made possible through funding from USDA Rural Utilities Services, and with support from private, state and county sources, TVSC serves as a hub offering a range of services. Specialty medical care provided at TVSC includes diabetes care and education, **HIV/AIDS** care, osteopathic medicine, orthopedics, pulmonology, podiatry, gynecology, dermatology, endocrinology, psychiatry, pediatrics, and infectious disease clinics. Videoconferencing capabilities also allow it to serve as a center for distance learning and community meetings in this rural area.

- The Indian Health Service (IHS) network has been providing telemedicine services since 2001. Currently, some of the network's clinics provide telemedicine services in multiple specialties, including endocrinology, retinal imaging, psychiatry, rheumatology, dermatology and other specialties. Through the FCC pilot project, new strategies will be developed for expanding services to include acute care and preventive services. This would give clinic staff expanded options for improving care in the community by bringing in specialists not otherwise available. Areas of priority include: endocrinology services for diabetics with the intent to decrease Hemoglobin A1Cs; retinal screening for diabetic patients; home health services to check blood pressure, weight, temperature, oxygen saturation for elderly or people who have been recently hospitalized; obesity prevention services including nutrition education, emotional support from licensed clinical social psychologists, psychiatrists and exercise physiologists; and heart disease programs such as the Coronary Heart Improvement Program (CHIP), which could be broadcast out to multiple sites.

## Governmental Partners:

The Office of the Governor is strongly supportive of this application and the need to create a state-of-the-art network. Multiple state agencies and offices have been involved in the development of the project and will continue to serve as ongoing partners.

California Health & Human Services Agency (CHHSA) has a lead role in implementing Governor Arnold Schwarzenegger's health reform proposal which calls for accessible, efficient and affordable health care. CHHSA administers state and federal programs for health care, social services, public assistance and rehabilitation. Responsibility for administering the state's major programs, which provide direct services to millions of Californians, is divided among the Agency's 11 departments and one board. CHHSA partners

with public and private industry and consumers to pursue avenues of accessibility, affordability, and quality of health care for all Californians. These goals are supported in the recent Executive Orders 5-12 (State policy agenda for health information technology) and S-23 (Expanding broadband access and usage in California).

- The Office of Statewide Health Planning and Development (OSHPD) is a department of CHHSA and promotes health care accessibility through leadership in analyzing California's health care infrastructure, promoting a diverse and competent health care workforce, providing information about health care outcomes, assuring the safety of hospitals and health care facilities, insuring loans to encourage the development of health care facilities, and facilitating development of sustained capacity for communities to address local health issues.

California Business, Transportation and Housing Agency (BTH) oversees the activities of 13 departments consisting of more than 42,000 employees, a budget of more than \$11 billion, plus several economic development programs and commissions. Its operations address financial services, transportation, affordable housing, real estate, managed health care plans and public safety. BTH has been designated by Governor Arnold Schwarzenegger to lead the state's broadband initiatives. All three aspects of its core infrastructure responsibilities—business, transportation, and housing—are central to expanding access and usage of broadband technologies. As the infrastructure agency, BTH personnel have devoted significant time and resources to furthering broadband deployment and access in California. BTH staff have been responsible for the design and implementation of a variety of broadband initiatives, involving private and public stakeholders.

The Secretaries of the Health and Human Services Agency and the Business, Transportation and Housing Agency have been directed by Governor Arnold Schwarzenegger to work with public and private sector stakeholders to develop a sustainable business model for an eHealth network connecting rural health clinics to medical centers throughout the state using telemedicine and other technology.

- The California Department of Managed Health Care (DMHC) is a department of BTH and works to ensure a more affordable and accountable managed care delivery system that promotes healthier Californians. DMHC regulates the care provided to more than 21 million Californians receiving coverage from 47 full service and 54 specialized health plans. As a first-in-the-nation consumer rights organization, DMHC helps California consumers resolve problems with their health plans. As the largest regulator of managed care in the nation, DMHC ensures the solvency of health plans, which comprise nearly 5% of the state's Gross Domestic Product. DMHC works aggressively to ensure that the value of California's managed care system continues to offer among the lowest cost premiums in the nation.

As a condition of the approval of a merger between United Health Group and **PacifiCare** of California, DMHC secured a commitment of \$250 million in community benefits for California consumers. These funds will be used to improve health care information technology infrastructure in rural and underserved communities, improve medical education in key areas of the state, and provide other investments in projects designed to serve low income populations.

The California Office of Emergency Services (**OES**) delivers extensive emergency management training programs to every public employee in California who may be tasked with responsibilities in a disaster. OES works closely with partners in the California Health and Human Services Agency to assist their coordination

of state-level preparedness for health-related emergencies in support of the health care industry and all California stakeholders.

The California Public Utilities Commission (CPUC) is a constitutionally independent California agency charged with regulating privately owned telecommunications, electric, natural gas, water, railroad, rail transit, and passenger transportation companies, and issuing statewide video franchises. The CPUC is responsible for ensuring that customers have safe, reliable utility service at reasonable rates, protecting against fraud, and promoting the health of California's economy.

The CPUC has committed significant resources to improve broadband services throughout the state, particularly focusing on unserved and underserved areas. Its creation of the California Emerging Technology Fund in 2005, its many policy decisions encouraging the development of broadband facilities in California, its reports on the state of broadband in California and its participation on the Governor's Broadband Task Force are among many examples of the CPUC's commitment to broadband.

The CPUC has strongly supported the California Telehealth Network project by providing staff and resources to assist with this application. Should this application be granted, the CPUC will lend support in the following areas: advising as to the FCC and Universal Service Administrative Company (USAC) process and procedures related to the pilot project; coordination with the California Teleconnect Fund, including assistance in identifying specific needs of rural health providers in California; provision of publicly available data regarding current telecommunication provider networks; and advice regarding telecommunication law and policy.

- The California Emerging Technology Fund (CETF) is a non-profit public-benefit corporation established pursuant to orders from the California Public Utilities Commission in approving the mergers of SBC-AT&T and Verizon-MCI. The companies are required to contribute \$60 million to CETF over five years. The mission of CETF is to provide statewide leadership to minimize the "digital divide" by accelerating the deployment of broadband and other advanced communication services to underserved communities and populations throughout California. CETF will contribute \$3.6 million towards the 15% required match for the FCC Rural Health Care Pilot Project and will serve on the advisory board. CETF will also help engage and mobilize community-based groups, civic leadership organizations, charitable foundations, and the private sector to support the development of the telemedicine system.

The California Institute for Telecommunications and Information Technology (Cal **IT2**) helps to ensure that California maintains its leadership in the rapidly changing telecommunications and information technology marketplace. Created by UC campuses at San Diego and Irvine, Cal IT2 and its faculty, students, and researchers partner with leading California telecommunications, computer, software, and applications companies to conduct research on the scientific and technological components needed to expand and improve the Internet. Institute applications researchers are conducting studies in "living laboratories" to investigate how the future Internet will accelerate advances in environmental science, health care, and other fields.

## Other Organizations:

The California Hospital Association (CHA) represents nearly 500 hospitals and health systems. CHA provides member hospitals with state and federal representation and advocacy in the legislative and

CPCA also recognizes the importance of advancing the integration of health information technology (HIT) in community clinics and health centers, and has taken a leadership role to ensure that safety net providers have access to the resources needed to participate in HIT and telehealth. CPCA also works with clinics to share information about health information products and services, and to provide opportunities to share best practices. As a participant in the California Telehealth Network, CPCA will represent the interests of community clinics and health centers, and provide policy and advocacy leadership to expand implementation of telemedicine and connectivity for rural providers through public and private funding to leverage the efforts undertaken through this project.

## Work Plan

An incremental deployment of telecommunicationsto 319 health care providers is expected over three years: however, the scalable design will enable more health care providers to connect to the network thereafter. We understandthat although the FCC pilot period is two years in length, our partner organizations are working toward a longer term vision of a ubiquitous statewide network, for which the FCC pilot would be an initial building block.

	YEAR ONE	YEAR TWO	YEAR THREE
<b>Organizational Infrastructure</b>			
Convene Program Advisory Board	X	X	X
Convene working groups	X	X	X
Establish payment/reimbursement process	X		
<b>Study/Planning Phase</b>			
Perform network design studies and create vendor RFIs	X		
Hire technical site assessment team	X		
Perform assessment of sites including network, technical, clinical and financial assessment	X	X	X
Complete form 465 for Health Care Providers (HCP)	X	X	X
Develop study phase report/review, including business plan, site implementation plan, technical specifications	X		
Develop sustainability plan	X	X	X
<b>Network Design/Specification Phase</b>			
Establish central network operations center for monitoring	X		
Develop security services	X	X	X
Develop specifications and RFP	X	X	X
Evaluate proposals and select vendors	X	X	X
Develop detailed project plan, including implementation schedule	X		
Coordinate interface to NLR and	X	X	X

Internet2			
Prepare training materials	X	X	X
Update network design	X	X	X
Implementation Phase			
Deliver pre-deployment training	X	X	X
Coordinate Forms 466 and 467 with USAC	X	X	X
Deployment	X	X	X
Develop deployment phase reports/reviews	X	X	X
Deploy redundant emergency communications modalities	X	X	X
Provide site technical support and maintenance	X	X	X
Provide distance education planning/testing	X	X	X
FCC Reporting			
File annual report on project with FCC and all stakeholders	X	X	X

## Budget

A preliminary estimate of the costs associated with management of the project totals \$975,000 for Year One, and \$1.25 million for Year Two. These costs include staff for management, administrative, technical, financial and training components, as well as the expenses of convening various advisory groups, videoconferencing and bridge support, travel and supplies. Funding for management of the project will be sought from various public and private sources.

## 10. Coordination of Telemedicine Programs

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California is committed to increasing the availability and utilization of telemedicine to benefit patients and improve the quality of life for the state's diverse population. A large degree of coordination will be required over the course of the pilot to connect 319 California health care sites, academic centers of excellence, for-profit health care providers, and other state and national resources. This coordination will be accomplished through the active management of the California Telehealth Network by the University of California. Leveraging existing resources, a wide array of partners, including: state agencies, public and private health care providers, health-related associations, and many other stakeholders, are committed to working with UC to successfully create this new statewide network.

A proposed Program Advisory Board will be instrumental in assisting UC's Office of the President and the UC Davis Health System in planning and managing the activities of the network. UCDHS, serving as the lead technical entity for the network, will coordinate with telecommunications providers, existing regional telemedicine networks and new health care provider sites. Additionally, UCDHS' extensive experience in developing telemedicine programs will help them coordinate network activities related to the delivery of telemedicine services between medical specialists and rural providers. The first phase of the pilot will emphasize planning and will build upon the work already undertaken to ensure that all of the necessary structures and elements are in place to assure that this will be a well-coordinated statewide effort.

Please see Section 2 (Goals and Objectives), Section 8 (Previous Experience) and Section 9 (Project Management Plan), for further details regarding the network design; provision of technical assistance to network participants; previous experience in developing and managing telemedicine programs; management structure; participating partners; and the proposed program advisory board.

## 11. Sustainability Plan

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This section describes the University's thoughts to date about how best to approach sustainability of the California Telehealth Network (CTN). A detailed sustainability plan will be developed during the planning phase. Key elements of the plan will include:

- Creation of a business model and financial plans to secure and efficiently leverage diverse sources of funding and integration of for-profit providers;
  - Performance of needs assessments to ensure service offerings meet stakeholder needs;
- Development of scalable network architecture, infrastructure and technology roadmaps to ensure the network meets projected needs and future expansion including integration and interoperability with other provider networks, home telehealth, and integration of new technologies supporting mobility; and
- Marketing activities to include additional participants.

As described in other sections of this application, the CTN will complement two other actions taken by the state that are advancing telemedicine throughout California. The first of these was establishment of a non-profit corporation, the California Emerging Technology Fund (CETF), by the California Public Utilities Commission. The purpose of the CETF is to achieve ubiquitous access to broadband and advanced services in California, particularly in underserved communities, through the use of emerging technologies by 2010. The second of the state's actions was the establishment of the California Broadband Task Force (CBTF) by Governor Schwarzenegger through Executive Order S-23-06 (see Appendix D). The CBTF is identifying barriers to broadband access and opportunities for increased broadband adoption.

The establishment of the California Telehealth Network is in keeping with the state policy outlined in Executive Order S-12-06, in which Governor Schwarzenegger directed the Secretaries of the Health and Human Services Agency and the Business, Transportation and Housing Agency, the Director of the Department of Managed Health Care and the State Chief Information Officer to work with public and private sector stakeholders to develop a sustainable business model for an eHealth network connecting rural health clinics to medical centers throughout the state using telemedicine and other technology. Recognizing that additional funds are vital to sustaining the network that the FCC funds would help launch, the stakeholders will work to develop a sustainable network that will attract additional investors to leverage their own funds into this effort. Other potential funders interested in this effort include the United Healthcare Charitable Commitment and the California Partnership for the San Joaquin Valley. Private funders such as the California Healthcare Foundation will also be approached. Each of the investors will be able to leverage their funds within the scope of their respective organizations, as we collectively work to build and sustain the California Telehealth Network.

While the FCC funding would provide the initial investment needed for increased connectivity for rural health care providers, additional funding is required to sustain the provision of telemedicine services. Further investment will be required in areas including: telemedicine equipment and maintenance; technical support to identify and install appropriate telecommunications equipment; and training that prepares providers not currently using telemedicine for entry into the network.

The initial set of public and private sector investors and their investments are described below.

	Year 1	Year 2	Year 3
Proposition 1D*	TBD	TBD	TBD
San Joaquin Valley	\$ 150,000	\$75,000	TBD
UC Merced and	\$5,000,000	\$5,000,000	TBD
United Healthcare Charitable	Pending	Pending	Pending
Centers for Medicare and Medicaid Services Pilot Project	TBD	TBD	TBD

\* Possible equipment purchases through "-community investment fund

### FCC Rural Health Care Pilot Program Investors

California Emerging Technology Fund. As part of its mission to support telemedicine statewide, the CETF will commit at least \$3.8 million to support the California Telehealth Network project. This will be used to fund most of the fifteen percent of the budget of the pilot program required as a cash match by the FCC.

Proposition 1D. \$200 million in bond funding approved in November 2006 to support infrastructure needs to increase class size in UC medical schools and to expand telemedicine programs throughout the state. This includes new resources for facilities and state-of-the-art equipment, some of which may be placed in rural health facilities in connection with expanded telemedicine programs and UC medical education efforts.

United Healthcare Charitable Commitment. UnitedHealth and Pacificare of California agreed as a condition of the approval of their merger in California to a contribution of \$50 million to benefit California health care consumers. Of this initial \$50 million commitment, approximately \$37.5 million remains unencumbered. The agreements executed between United Health, Pacificare, and the California Department of Insurance and the Department of Managed Health Care specified the uses of these funds as follows:

- Subsidies and outreach for individuals who are eligible for both Medicare and Medi-Cal (dual eligibles) who are unable to pay premiums for Medicare managed care products after the start up of Medicare Part D, and other subsidies and outreach to support other programs that serve low income populations;
- Technology improvements for safety net providers;
- Medical education programs in underserved areas that will provide expanded access and service to traditionally underserved communities in California;
- Population-based preventive health strategies;

- Further support for the coordinated care initiatives; and
- Cash or in-kind contributions to help establish and support health care information technology initiatives designed to improve health care delivery.

A request is in place to both the California Department of Insurance and the United Healthcare Charitable Commitment to support allocation of \$3 to \$9 million of the charitable commitment to be used over a period of three years for telemedicine and/or telehealth projects that will leverage the California Telehealth Network. Such an investment falls directly within the intent of the agreements stipulated at the time of the merger approval. Such an investment builds upon recent efforts within the Governor's Office, given that it would: support the broadband action identified in the Health Care Reform Proposal and provide experience to the public and private sector stakeholders that will be involved in developing a sustainable business model for an eHealth network connecting rural health clinics to medical centers throughout the state using telemedicine and other technology.

California Partnership for the San Joaquin Valley. Launched by an Executive Order from Governor Schwarzenegger in June 2005 (renewed in November 2006), the California Partnership for the San Joaquin Valley is an unprecedented public-private partnership focused on improving economic vitality and quality of life for the Valley's 3.4 million residents. The Partnership is addressing the challenges of the region by implementing measurable actions on six major initiatives to help the San Joaquin Valley emerge as California's 21<sup>st</sup> Century Opportunity.

As part of the Partnership, four health clinics are to be established (all connected electronically) in the Central Valley, by the University of California, Merced. Money to start the project comes from a \$225,000 seed grant from the Partnership. The four health centers will connect into a network hub at UC Merced, and each will be equipped to provide telemedicine services via videoconferencing and by using specialized equipment. The centers also will be used to provide training for physicians, medical students and allied health professionals throughout the region. A number of organizations have expressed interest in partnering to develop the network, including UC Davis; UCSF - Fresno; Central Valley Health Network; California Emerging Technology Fund; California Telemedicine and eHealth Center; Great Valley Center; and United Cerebral Palsy of San Joaquin, Calaveras and Amador Counties. Locations for the clinics have not yet been announced.

Proposed Centers for Medicare and Medicaid Services (CMS) Grant to Fund Rural Health Care Providers. The Rural Health Care CMS Pilot Project is a two-year program that would integrate with, and leverage the proposed California Telehealth Network as well as other HIT efforts. The role of the CMS project will be to stimulate adoption of eHealth technologies and systems through providing funding in the first two years for telemedicine equipment and other related items that are not covered by the FCC Grant and the California Emerging Technology Fund (CETF) partnership. Obtaining Year 1 and 2 funding for the Rural Health Care Pilot Program will guarantee the ability of the California Telehealth Network to build a secure foundation with rural Medi-Cal providers by providing much needed equipment, training and support. As a result, fewer rural Medi-Cal providers will expend scarce resources to purchase technology equipment for telemedicine, or be unable to participate in the Telehealth Network due to lack of funding for equipment or training.

Additional investment is required in areas including: telemedicine equipment and maintenance; technical support to identify and install appropriate telecommunications equipment; and training that prepares

providers not currently using telemedicine for entry into the network. With the basic needs for telemedicine connectivity funded, future investments will be more diversified and allow the sustainable investment plan and strategy time to build.

California Telehealth Network Components and Ancillary Activities for Which **Non-FCC Funding Will Be Sought**. The following table describes activities for which non-FCC funding will be sought.

<b>Component/Activity</b>	<b>Description</b>
Telemedicine equipment c maintenance	Costs associated with the purchase or lease, upgrading and maintenance of telemedicine equipment such as videoconferencing equipment, diagnostic equipment and other devices used in the practice of telemedicine.
Training health care providers: Increase the number of specialists to meet the demand for telemedicine services in underserved areas	The University of California's new Programs In Medical Education (PRIME) focus on specialized training of physicians who are committed to meeting the needs of various rural and urban underserved populations. Each campus' PRIME program contains specific training in telemedicine.
Operational costs of managing the California Telehealth Network	Funding will be needed for management and staffing of the administrative, technical, financial and training components of the CTN, as well as the expenses of convening various advisory groups, videoconferencing and bridge support, travel and supplies.
Operational costs of regional telemedicine networks	Funding will be needed for the administration of the regional telemedicine networks, including the Indian Health Services, which are being upgraded and interconnected as the CTN grows.

The establishment of the CTN will improve access to quality health services afforded by telemedicine, facilitate cost savings associated with the development of telemedicine and increased use of electronic health record (EHR) systems and new health information technologies. This work is fundamentally important to broader HIT efforts, creation of an advanced technology infrastructure, and development of a sustainable eHealth network.

# Appendices

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- A. Network Design (Detail)
- B. Required Waivers
- C. Governor's Executive Order S-12-06
- D. Governor's Executive Order S-23-06
- E. List of UC Specialty Services
- F. Acronym List
- G. Letters of Support/Commitment
  - 1. University of California, Office of the President
  - 2. UC Davis, Office of the Chancellor
  - 3. UC Davis Health System
  - 4. California Public Utilities Commission
  - 5. California Emerging Technology Fund
  - 6. California Partnership for the San Joaquin Valley
  - 7. Northern Sierra Rural Health Network
  - 8. Southern Sierra Telehealth Network
  - 9. Central Valley Health Network
  - 10. Open Door Community Health Centers
  - 11. Community Clinics Health Network
  - 12. Indian Health Service
  - 13. Great Valley Center
  - 14. California Institute for Telecommunications and Information Technology
  - 15. California Hospital Association
  - 16. California Telemedicine & eHealth Center
  - 17. California Primary Care Association
  - 18. California State Rural Health Association
  - 19. University of California, Berkeley, CITRIS

# Appendix A

## Network Design (Detail)

## Appendix A – Proposed Network Design

This appendix includes a detailed description of the proposed California Telehealth Network architecture. The design is expected to accommodate 319 health care sites throughout the state, and incorporates provisions for accommodation of alternative technical designs that may offer cost savings or other advantages on a regional basis. The California Telehealth Network architecture will support a comprehensive set of design objectives that are described in this section.

The California Telehealth Network will be composed of a high performance network backbone that interconnects with separate regional hub infrastructure. The regional hubs will serve as “aggregation points” for collecting multiple circuit connections distributed to individual clinics, physicians’ offices, and other sites. The proposed network will include rural health sites connected to regional hub infrastructure and to the nationwide backbone via “clouds” in which peer-to-peer telecommunication can take place twenty-four hours a day, seven days a week.

### Backbone Services

The backbone will be developed in ways that:

- (1) Span the largest extent of the state possible. The backbone will be composed of multiple routing centers interconnected via dedicated fiber links or high capacity common carrier circuits after an open bid process;
- (2) Provide regional “meet points” or “points of presence (POP’s)” where regional hub infrastructure will connect. POP’s will be geographically distributed to provide path diversity and minimize mileage dependent circuit fees where applicable;
- (3) Provide high quality, dedicated access to key regional providers of telehealth services, including: UC campuses and medical centers; California State University campuses; California Community College Campuses; Stanford, Loma Linda University; University of Southern California; and other private California universities; and
- (4) Provide high speed access to other statewide and national network infrastructures, including: CalREN2 National LambdaRail; and Internet2.

### Regional Hub Infrastructure

Distribution of network connections into remote areas will occur via the regional hub infrastructure. The type of regional hub infrastructure employed will be based upon an evaluation and optimization of multiple technical, logistical and financial considerations. As part of the decision-making process a variety of questions will be asked, including those such as:

- What is the aggregate cost of establishing a regional hub infrastructure, including circuit costs, facility costs, and personnel costs?

- Which technical alternatives will provide the maximum reliability? Which will support the required advanced feature set, including end-to-end Quality of Service (QoS) into those participant sites where telemedicine support will be important?
- Are there regional hub infrastructure sites available in locations where fiber extension of the network backbone is possible or economically practical?
- Which options are most likely to be implemented in a timely enough fashion that significant operational experience can be gained during the first two-year period?

Primary and Alternative Regional **Hub** Infrastructure Designs. California Telehealth Network regional hub infrastructure design will include a primary design, together with the potential for alternative compatible designs within specific regions of the state where (for logistical, financial or technical reasons) the primary design might not be optimal. The primary design is proposed to offer an innovative coordination of a Multi-Protocol Label Switching (MPLS)-routed mesh of virtual regional hubs, incorporating regional Incumbent Local Exchange Carrier (ILEC) or Competitive Local Exchange Carrier (CLEC) facilities interconnecting. The resulting "cloud" will converge at a common meet point at multiple convenient POP facilities of the backbone provider. Individual regional sites will connect to their local ILEC via T1 or other supported circuit modality. Interconnection of the individual ILEC circuits to the provider will be provided via PVC's on the existing interexchange carrier trunking facilities (or other backhaul facilities) between the ILEC and the nearest provider's POP. Such an arrangement will provide the broadest possible statewide availability of virtual regional hub connect points, while avoiding the cost and delays of installing and provisioning a dedicated physical infrastructure.

Virtual Regional Hubs. Virtual regional hubs will be provided by the telecommunications companies ("telcos"). Such virtual regional hubs are designated as "virtual" because there is no actual physical hub site required. Alternatively, the virtual regional hub could be a collection of telco circuits, together with specialized routing and switching software and hardware located at central offices that together operate as an efficient, effective virtual regional hub.

All vendors provide SNMP network management support, permitting integration of their real-time network monitoring data into the project's proposed Centralized Network Monitoring Facility. All major vendors provide the required security features through Virtual Private Network (VPN) circuits. These services may be transparently extended to external networks via Internet routed security protocols, such as SSL, L2TP and IPsec. All vendors support a broad range of IP (public and private) addressing paradigms. A wide spectrum of bandwidth capabilities is available, ranging from fractional T1 through OC48, depending upon location, needs and cost considerations.

The proposed network will interoperate with commonly used EGRP and IGRP routing protocols used on regional and national backbone networks (e.g., eBGP), as well as those utilized on private and local area routed networks (e.g., OSPF). Consultative services will be available to assist participants in appropriately modifying static routing protocols. In areas not serviced by a telco providing virtual regional hub services, it is possible to provide "bridging circuits" from the regional telco to the nearest virtual regional hub provider with no loss of QoS, but at an additional cost.

- **Regional Hubs – Innovative Designs.** The network architecture is designed to provide a high quality infrastructure that spans the largest possible geographic extent of the state and the largest possible

group of sites located in rural areas according to the RUCA rural designation. Based upon an assessment of the: distribution of ILEC/CLEC facilities; availability of interexchange carrier trunking and other backhaul facilities; and distribution of POP's and circuit capacities of potential backbone providers, it is estimated that the architecture can encompass at least 90% of the state. During the formal design specification phase and the RFP-based vendor selection phase, vendors will be encouraged to propose alternative regional solutions that are compatible with the overall network design. Multiple awards for regional hub infrastructure may result in order to provide the highest possible quality at the lowest infrastructure costs for the broadest possible population.

Providers of alternative regional hub infrastructure services will be held to high standards for quality and interoperability with the California Telehealth Network. These standards include, but are not limited to: local support for physical facilities; and meeting technical requirements for integration of the regional hub infrastructure into the backbone. These might include: adherence to IP addressing plan standards and assignments; preservation of QOS designation and provisioning for preferential priority in/out of the network backbone; meeting Network Address Translation requirements; providing firewall services consistent with the California Telehealth Network standards, either at the regional hub infrastructure level. or at each participant site; and others.

**Existing Regional Telehealth Networks Serving as Regional Hubs.** Six existing regional telehealth networks (E-RTN) will initially participate in the pilot. To varying extents, these networks provide comprehensive network and telehealth-related services to regional sites. The California Telehealth Network will leverage and upgrade existing infrastructure and expertise to further expand in their principal coverage areas. Services to existing network customers will be enhanced through connection to the California Telehealth Network, National LambdaRail, and Internet2. Nearly all anticipated services available to sites directly connected to the virtual regional hubs will be available to sites connected through an E-RTN.

One option for integrating each E-RTN into virtual regional hubs would be to install (or upgrade) appropriate local loop trunking circuits from their respective hub sites, through their ILEC's, that will extend as necessary to the virtual regional hub's network provider's nearest POP. Trunking circuit bandwidth requirements will be assessed for each E-RTN and provisioned at a level sufficient to meet the overall California Telehealth Network QOS requirements for each participant. It is anticipated that those bandwidth requirements will initially range from T1 service for smaller E-RTN's, through full DS3 service for larger E-RTN's. The intrinsically extensible nature of the California Telehealth Network's design is intended to enable bandwidth and circuit upgrades on a regional or per-site basis without needing to change regional network topology or capacity. As bandwidth and utilization increases, it will likely be necessary to uplift the trunking capacity at the meet point between the virtual regional hubs and the backbone network. This will simply be a matter of re-provisioning the circuit and/or upgrade of the border routers and will require no other network modifications.

The E-RTN's will serve as an effective resource for other newly-connected sites. It is expected that the E-RTN technical support staff will serve in a consultative role to new sites and assist with problem solving. Because the California Telehealth Network is a logically "flat" network, the newly-connected sites may develop collaborative relationships with E-RTNs that are independent of centralized California Telehealth Network intervention and (from a network perspective) can operate as if they were a full participant. Although access to the full range of E-RTN services might require mutual E-RTN firewall tunneling provisions, full network integration would otherwise be a straightforward process. Existing E-RTNs are shown below.

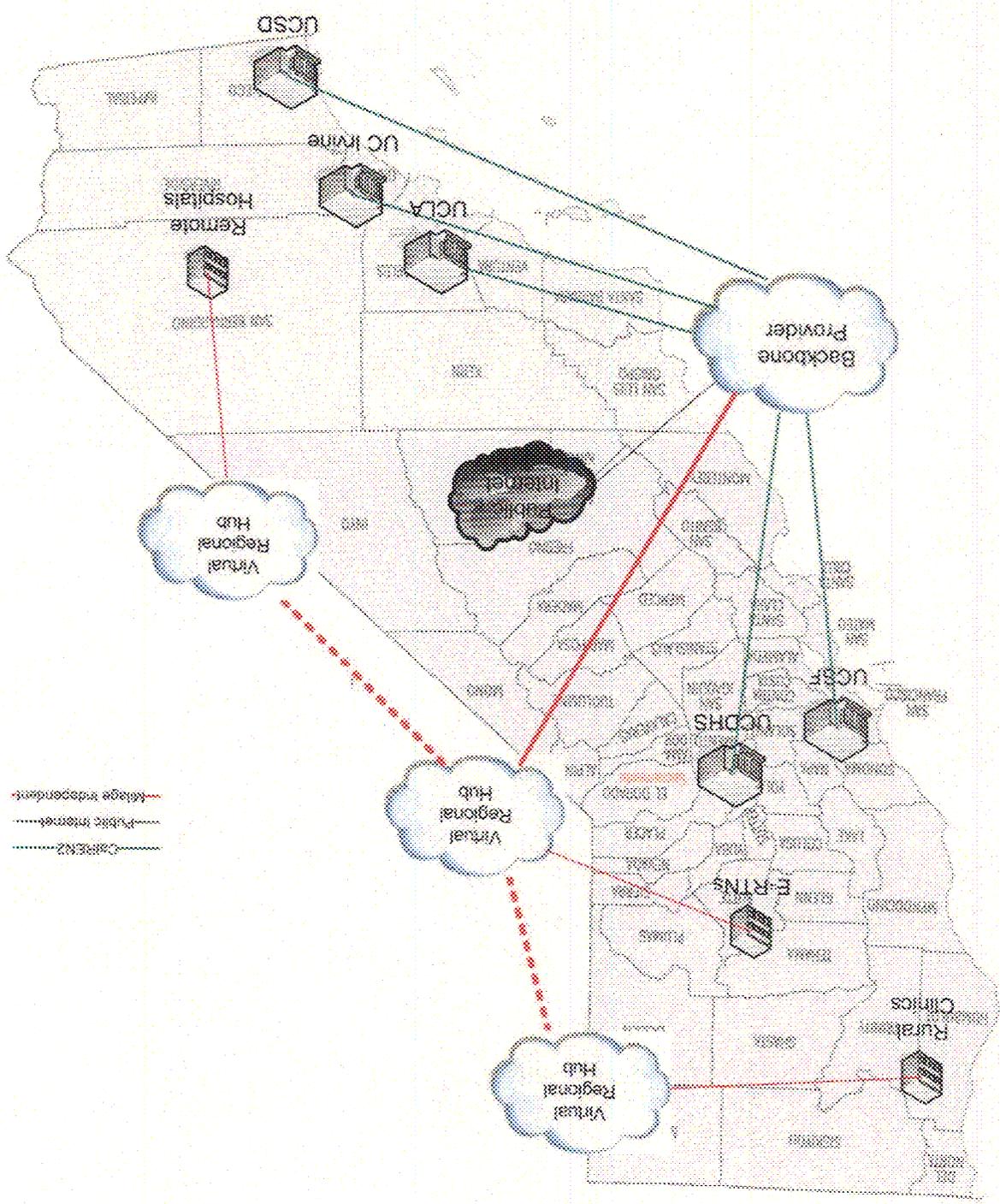


**Technical Specifications.** Subject to the initial study phase, the network design may encompass the following technical specifications:

- (1) IP-based addressing scheme: During the initial phases of network development, the IP addressing paradigm would employ IPv4 addressing in order to facilitate assimilation of E-RTNs and provide the broadest possible opportunity for vendors to compete. For planning purposes, however, particular consideration will be given to the issue of compatibility with the emerging IPv6 standards. Because the MPLS routing protocol essentially operates at "ISO-OSI Level 2.5", this issue is not entirely relevant to routing services within the network of virtual regional hubs. However, because the network will be peering with external networks, it will be important to ensure that vendors can provide an efficient and cost-effective capability to upgrade to IPv6 in keeping with anticipated industry-wide and governmental initiatives, and that new features intrinsic to IPv6 will be supported by CTN vendor participants. The RFP process will specifically address network requirements for IPv6 compatibility.
- (2) Dynamic routing of sessions among all network members, external resources and the Internet: Each participant node will have assigned either a fully routable public IP address, or where private IP addressing is employed, suitable gateways will provide interoperable access to publicly addressed (Internet) locations.

- (3) Isochronous circuits maximally employed, minimally in the network backbone: Network circuits will provide high quality video and audio support, free of jitter and dropouts – problems that are common with many networks, particularly those employing standard IP routed components. At the circuit level (OSI Level 1), links should provide isochronous service (e.g., ISDN, T1, ATM-CBR).
- (4) Quality of Service (QoS) designation support, with persistence of **QoS** tagging across intercarrier exchanges: At the data link, network and transport levels (OSI Levels 2/3/4), the transport/routing protocols are anticipated to provide for end-to-end QoS designation. In the Wide Area Network arena, connections will likely need to traverse multiple common carriers and client networks as a means of preserving **QoS** designations.
- (5) HIPAA-compliant security, employing encryption over non-secure links: The proposed network will provide HIPAA-compliant security capabilities. Common carrier circuits are designated by Health and Human Services to be “private circuits.” They are considered secure and transmission of ePHI over them is considered HIPAA-compliant. Extension of carrier circuits into internal networks, or transmission via the Commodity Internet, is not secure. The California Telehealth Network will provide additional session-based security capabilities via a session-based encryption methodology or most conveniently by supporting circuit-based, encrypted VPN connections that would provide the desired level of security
- (6) Traffic engineering capability, supporting designation of bandwidth and logical traffic segmentation: The network will provide some means of traffic engineering -- the ability to modulate bandwidth allocated (and cost) either automatically or manually. Emerging network protocols such as MPLS provide such capabilities and are provided by some carriers.
- (7) Bridging capabilities to integrate existing “legacy” connections (e.g., point-to-point, ISDN): Regional bridging facilities will be established for this purpose at locations throughout the network. The use of commercial bridging services may also be considered for regions where there are logistical and financial benefits. Several E-RTNs support ISDN bridging services. These will be integrated to provide bridging capabilities for new and existing participants.
- (8) Comprehensive, ubiquitous, centralized network monitoring capability. Although geographically dispersed, the network will be accessible to centralized, real-time continuous monitoring. Because of the geographically dispersed nature of the network (potentially traversing multiple common carriers and numerous private network linkages), there is a potential for “balkanization” of support and monitoring among regional entities. Many years of experience supporting telemedicine at UCDHS has demonstrated that ‘Yracted support leads to inefficient, inconsistent, and unreliable services. Equipment and circuits will support a standards-based network monitoring and management protocol, such as SNMP.
- (9) Device-Level Remote Monitoring: In addition to network circuit monitoring, proposed project centralized monitoring facilities will incrementally increase capability to remotely monitor customer device levels. Many manufacturers provide the necessary RFC 1155-compliant Management Information Bases (MIB's) that permit remote monitoring of device status via SNMP monitoring. In addition, TCP port level interrogation may be employed where network services can be unambiguously associated with particular TCP ports. The ability to enable such services will be dependent upon establishing the necessary tunneling provisions through customer Firewall/IDS facilities.

- (10) Integration of the project with regional and national broadband networks, including Internet2 and National LambdaRail.
- (11) Transparency: The interface between the California Telehealth Network and a client's internal network will be as transparent as possible. Most medium to large health care facilities already have established internal networks that support local activities. However, these networks are not routinely used to distribute telemedicine and other remote activities due to a variety of technical and other constraints, some of which relate to specialized remote circuit connection requirements. Access to all California Telehealth Network services should be conveniently available at all host network access points. It is inevitable that specialized California Telehealth Network hardware and software will be required to access certain remote services, such as teleconferencing. However, if specialized California Telehealth Network circuits need be extended into various locations within the client premises, the logistical constraints alone could seriously reduce usage, particularly for ad hoc encounters. The local host network should therefore be maximally integrated into the external network.
- (12) Standards: Network hardware, software and communications protocols should be based upon broadly recognized standards. In particular, TCP/IP-based services, such as FTP, HTTP, and SMTP should be fully supported. Comprehensive support for H.323 videoconferencing protocols will be ubiquitously implemented.
- (13) QOS Bridging and VLAN Integration: To provide end-to-end QOS, it is necessary to properly program the respective equipment that manages the interface between the virtual regional hubs and the network backbone. Various QOS flags that are used to identify a given data packet's priority are set slightly differently among vendors. During recent discussions with several network service providers, this question was discussed. In all cases, technical representatives indicated that establishing the necessary interconversions should be straightforward. These and related technical points regarding interoperability of QOS designations will be carefully defined and potential solutions will be tested and confirmed in a timely fashion prior to any deployment.
- (14) Virtual Regional Hub - Backbone Integration: The MPLS virtual hub infrastructure internally employs a high capacity backbone supporting the MPLS routing protocol and providing peer-to-peer integration of each physical connection point into a logically "flat" network. In such a design, it is not necessary to connect the California Telehealth Network's backbone to the MPLS network of virtual regional hub at multiple points; a single high bandwidth connection will serve to provide high quality service to all segments of the MPLS network of virtual regional hubs. For the purposes of providing fail-over redundancy, it may be desirable to establish two interfaces, each at a geographically distinct location. Numerous geographically diverse "meet points" are available between all prospective virtual regional hub providers and backbone providers.



The following illustrates a hypothetical interconnection of rural participants using a virtual regional hub model: