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Executive Summary

Tennessee is the first to award a contract to private industry to manage the state's Wide Area Network.

The Tennessee Information Infrastructure (TNII) project is a provider-managed, multi-service wide area network, for the purpose of establishing universal access to enhanced and emerging communications services for state and local government and higher education.

Over the past year, the TNII project has helped Tennessee transition from a state-owned network to a private communications infrastructure that is more capacious, provides more services, and realizes concomitant savings to taxpayers. As a result, the State of Tennessee has implemented an idea that began in 1998; a cooperative vision through which to:

- Provide universal electronic access to government and service from government, making government efficient for taxpayers and useful for recipients of state services regardless of where they are located in Tennessee

- Create an interoperable network of networks, putting citizens on-line, not in-line

- Deliver improved communications infrastructure to a broad variety of state agencies, schools, local governments, and non-profit organizations – particularly in rural areas

- Provide emerging technology that facilitates telemedicine, telejustice, distance learning, imaging, geographical information systems, and Internet 2

- Create an interoperable network consolidating resources, eliminating redundancies, and yielding quantifiable savings through centralized management

- Ensure that the necessary physical and technological infrastructure is available within the state to encourage private sector investment

- Position our internetworking infrastructure to quickly adapt to emerging requirements from health, education, and homeland defense initiatives

State agencies, post-secondary schools, city and county libraries, and city and county government now select communication options from a "TNII catalog of services" which provides uniform pricing and universal access for all Tennessee counties. Pricing is therefore based on statewide volumes, allowing for low cost, bundled communications services. This allows previous capital expenditures to become more manageable and operating expenses more predictable, simplifying the budgeting process. The increased benefits have been realized with a reduction in annual operating expenses and more importantly, avoidance of up to $25 Million in capital investment. This arrangement also leverages the internetworking talents of the managed service provider for design, engineering, implementation, project management, and operational disciplines. This allows the State of Tennessee to alter resource allocations to the beneficial increase of core competencies and public services.

This new infrastructure has positioned Tennessee to rapidly execute a health initiative, facilitating interaction between the Department of Health and the Centers for Disease Control under the Bioterrorism Cooperative program.

As we continue the spirit of the TNII project, the key focus will be the cooperative development of the visions and applications that will increase opportunity for the individuals, communities and businesses of the State of Tennessee.
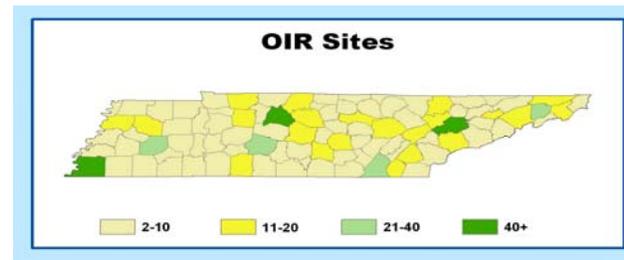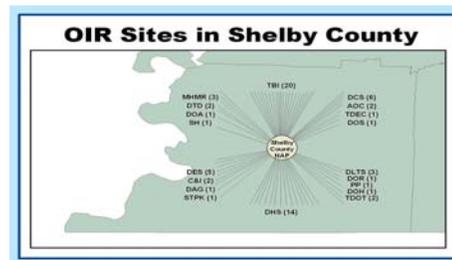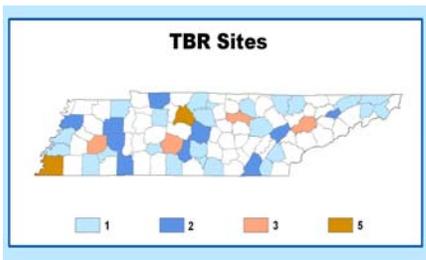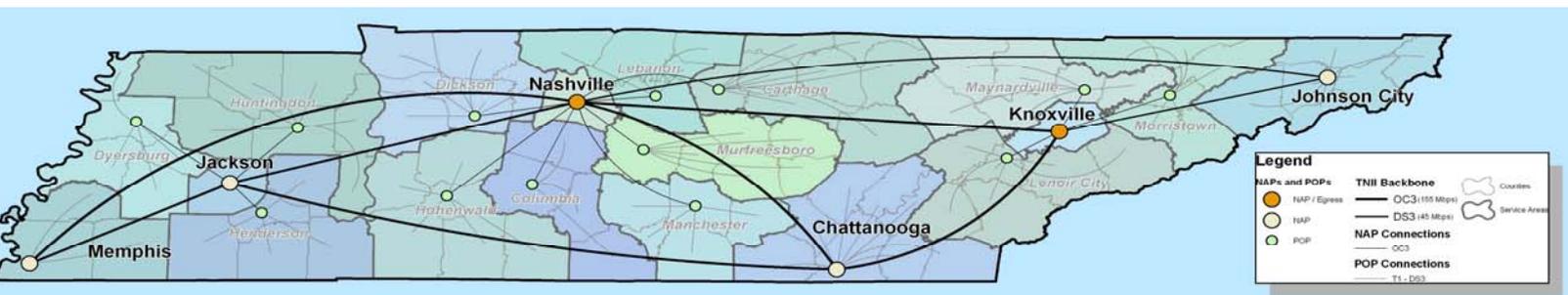
A: The Project: Tennessee Information Infrastructure (TNII)

The TNII project is the first state government, managed services network to use leading edge MPLS IP/VPN technology, allowing multiple entities with disparate IP addressing structures to co-exist on the same physical network infrastructure.

Today, a provider-partnership of BellSouth, Qwest, and their sub-contractors provide total managed network services. This includes design, provisioning, implementation, operations, monitoring, and asset ownership of wide area network core and customer premise edge equipment for over 1400 locations. This outsourced solution is known as the TNII network, and is partner-managed to the local area network interface of the state agency and educational institution's premise-based network.

The TNII network provides local, long, mobile, and global access to current and emerging data, voice, video and Internet services and is an infrastructure catalyst for tomorrow's advanced and collaborative applications. This is accomplished through the use of a carrier-class, Cisco Systems MPLS network that provides both ATM and IP/VPN services, leveraging a single, statewide communications infrastructure to provide virtual private networks or (VPNs). To date, four logical VPNs have been implemented for the State of Tennessee, Tennessee Board of Regents, libraries and local government, and for the University of Tennessee; providing network autonomy and security, while facilitating inter-communication within and between entities. A fifth logical VPN known as "TNII Common Services" shares complex networking solutions such as video, across subscribers from any of the logical networks; an approach that builds common solutions once, that can be used many times. IP telephony, a future deliverable, is another example of a common solution that can be leveraged rapidly across the TNII communications infrastructure.

The TNII network is also providing integration of the State's traditional IBM SNA and APPN application network with the IP, IPX, and multicast-based client/server application traffic, reducing parallel network expense. All of these applications benefit from the network's increased response time, quality of service mechanisms, and service level agreements; key requirements of today's outsourced networks. New state office and agency locations are added to the TNII network within 30 days, increasing our speed and agility to meet demand for public services.

B: Significance/Improvement to the operation of government

TNII fulfills a State of Tennessee strategy to provide an innovative, responsive and dynamic information technology infrastructure. The project provides the state and local governments and higher education with the required communications foundation to provide services faster and more efficiently. It is unifying educational network facilities, streamlining communications for government agencies, and bringing Tennessee to the forefront of the information highway.

By providing universal electronic access to state and local government agencies and service from governments, it's easier than ever for Tennessee's citizens and businesses to receive improved services. Improvements like:

- *Electronic governance* – developing a statewide approach for the use of e-commerce and electronic forms. For example: filing reports with state agencies, electronic purchasing of supplies and equipment, invoicing and payments to vendors, etc.

- *Pursuit of "one-stop shopping"* – improving the delivery of services to citizens while reducing the cost of providing those services, a must in this day of uncertain funding. For example: on-line building permits and business licenses, on-line voter registration, on-line tax notification and collections, etc.

- *Enhancement of education* – Internet access, distance learning opportunities and seamless information exchange greatly enhance the education experience. Emerging technology plays an increasing role in business practices, and Tennessee's students need to be appropriately equipped for the marketplace. For example: distance learning, collaborative applications, telemedicine, etc.

- *Closing the digital divide* – ensuring that the necessary physical and technological infrastructure is available within the state to encourage private sector investment. In today's information economy, an advanced telecommunications infrastructure is as essential as transportation infrastructure has been for the manufacturing economy. For example: TNII positions the State as the "anchor tenant" for network services in remote rural areas, encouraging private telecommunications companies to deploy infrastructure in locales they otherwise would avoid.

The State of Tennessee is now reducing costs through economies of scale and improving operational efficiencies. We are better able to focus on the 'core' business and not allocate internal resources to the day-to-day management of network operations. We are eliminating duplication of resources and investment among multiple governmental entities – allowing us to "do more with less". We have merged multiple networks onto a single infrastructure, simplifying management, procurement, and budgeting. The performance of the network is now guaranteed through service level agreements, improving our application responsiveness. Instead of managing separate bills, we have consolidated 20 plus carriers and service contracts into a unified contract, providing simplified, single vendor billing. Additionally, we have reduced management complexity of the typical amalgamation of state-affiliated agencies, schools, hospitals and other entities that need to share state network infrastructure. Through the TNII partnership arrangement, we have gained unique access to the enhanced skills and advancing technology that only an outside expert can bring.

These have significantly improved our readiness as an aggressive player in the expanding world E-economy, creating a data-centric foundation that will bring Tennessee future success.

C: Benefits realized by service recipients, taxpayers, agency or state

The TNII partnership is producing notable benefits. It has increased our speed and agility to meet demand for public services, while reducing operational and capital expenditures. It is delivering enhanced communications technology, even in rural areas, by utilizing a flat rate structure for all state locations, while improving the telecommunications services available to public and private enterprise.

Some of the benefits:

- Enables the State to better focus on core services
- Increases speed and agility to meet demand of public services
- Supports faster implementation and interoperability of new communications services
- Enables local governments and non-profits to purchase services without the request for proposal process
- Quickly adapt to emerging requirements from health, education, and homeland defense initiatives
- Reduces operational and capital expenses
- Provides predictable costs for communications infrastructure
- Improves operational efficiency, network reliability, and strategic scale
- Provides 24x7 monitoring and management
- Enhances security for communications, operations, and private data
- Provides access to leading technology with better price/performance metrics
- Accommodates a variety of future growth requirements
- Fosters economic development

The TNII network is an application enabler. Current advanced applications, including telemedicine, distance learning, GIS, and telejustice, were limited in where they were deployed, usually due to demanding specifications that were difficult to support. Now, any desired location can choose these applications because of the TNII network's comprehensive infrastructure and performance capacity. In addition, these applications save time and expense involved when exploring the alternative solution to achieve the same task. For example, a training session provided from Knoxville to Memphis via distance learning eliminates the need for the trainer to physically be in Memphis and incur travel expenses.

The TNII network outsources networking equipment and personnel, eliminating the need to manage these resources. Equipment can often become obsolete through technology advances within a few years. Management of personnel and benefits are difficult in this relatively short turnover, quick cycle industry. In order to support the enhanced services that are provided in the TNII network, the equipment involved and the technically competent people required to operate TNII are the service provider's responsibility.

The TNII network offers universal access pricing. Pricing is the same regardless of where the site is located in the state of Tennessee, providing equitable treatment to all regions of the state.

The TNII network includes a premium network support package. Network support coverage is 24x7x365. Strict response times and time to repair are defined for critical, major, and minor incidents. Comprehensive reporting is provided monthly. Connections to TNII are monitored in a proactive fashion to detect issues earlier.

The TNII network offers greater network redundancy, facilitating fewer interruptions to State operations. The use of carrier-class equipment and dual, multi-homed Internet egress locations contribute to the improved redundancy.

The TNII network is guaranteed through Service Level Agreements (SLAs). The provider complies with specific performance levels of services or pays penalties for non-conformance.

The TNII network supports Quality of Service (QoS) features. In order to deliver services such as voice and video, the network is capable of supporting mechanisms that ensure these services are delivered properly.

The TNII network will support packetized voice. With packetized voice, voice services can be delivered via the TNII network instead of on a parallel voice network. Cost savings through integration of voice services will be realized.

The TNII network scales in terms of bandwidth capability. The backbone distribution and end site circuit capacities can scale to the greater bandwidth demands that are required for enhanced network services such as H.323 video or Internet 1 and 2.

The TNII network offers greater security measures. A firewall is provided at the Internet egress points for each TNII Association member. Security management techniques with bi-annual security audits of the TNII network are enforced.

D: Return on investment, short-term/long-term payback.

TNII is a public/private partnership between the State of Tennessee, The Tennessee Board of Regents, University of Tennessee, collectively known as the TNII Association, and the BellSouth/Qwest team.

The cost justification for TNII was based on identifying and categorizing telecommunication expense; then utilizing five (5) different outsourcing models for the financial analysis:
1. Fully managed service,
2. Backbone service only,
3. Backbone and Tennessee Access Point (TAP) services without local loop,
4. Backbone and Tennessee Access Point (TAP) services with local loop, and
5. Dial service only.

Based on the results of the analysis, the fully managed service option provided the most cost-effective, statewide universal service offering that met the array of needs identified by the user base. Although the contract resulted in fully managed services, modifications to the contract for unbundled services are used to meet the needs of specific groups of customers, such as public libraries.

TNII Services
Single contract – One point of contact to interface with all 26 telephone companies, equipment providers and management.
Universal pricing and technology – regardless of where you are located in the State of Tennessee, urban or rural, the pricing and technology is the same.
Integrated voice, data and video –shaing of bandwidth
Service Level Agreements – performance of the network and fault management
Fault, performance, Security, Configuration, and Accounting Management
Two Percent Revenue Sharing – The TNII project is governed by the TNII Executive Steering Committee, which is comprised of the CIO for the State of Tennessee, TBR, UT and local governments.
Unlimited core backbone growth – currently OC3 backbone with DS3's to POPs
Internet egress security
Internet access bandwidth – 12 DS3's
Remote dial access at 56kbps to 128kbps
Centralized level 2 and level 3 NOC - 24 X 7 Managed Service

The following cost chart addresses the investment the State of Tennessee would have to make to create the capabilities, which TNII is providing. Even with a $25 Million investment the recurring charge to provide service ourselves would equal the cost to BellSouth/Qwest. The commercial revenue potential for the contractor's investment produces a win-win for both BellSouth/Qwest and the State of Tennessee.   The State of Tennessee can expect low rates based on volume, Tennessee communities will have a backbone in place for e-commerce expansion, and the contractor's can recoup their investment and earn a profit.

Service/Cost Comparison

	Previous WAN	**TNII Network**	**State Improvements required to equal TNII**
Backbone	Multiple T1s	OC3s & DS3s	OC3s & DS3s
End Site Access	Fractional to Multiple T1's	Fractional T1's through OC3	Fractional DS3 to OC3 upgrades
Integrated Technology	IP, IPX only	MPLS IP VPNs ATM, IP, IPX, SNA, Multicast	MPLS IP VPNs ATM, Multicast, DLSW
IP Core equipment	Enterprise Class Routers	Cisco Systems carrier-class switches/routers	Cisco or public switched equipment
Video	H.320 only	H.320 & H.323	H.323 MCU
Remote Dial	28.8kbps	56kbps, 128kbps, ISDN	56kbps, 128kbps, ISDN
Internet Access	2 DS3s	12 DS3s	12 DS3s
Internet Egress Security	Ad Hoc	Comprehensive Firewalls & IDS	Comprehensive Firewalls & IDS
Universal pricing	N/A	Pricing and Technology	Single Contract
Service Levels	N/A	Performance and Fault SLAs	EST's SLAs
Cost Avoidance			**Capital Investment $25M**