**POOL FUND SPR-3(099)**

**TEL8 TELECOMMUNICATIONS NETWORK:**

**A POOLED FUND STUDY FOR**

**TRANSPORTATION VIDEOCONFERENCING**

Timothy Horner, Program Director

Transportation Learning Network

Upper Great Plains Transportation Institute

North Dakota State University

for the

North Dakota Department of Transportation

Final Report

2000 – 2015

Prepared for:

US. Department of Transportation

Federal Highway Administration

North Dakota Division

Bismarck, North Dakota

**NOTICE**

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for the contents of use thereof.

The United States Government does not endorse products or manufacturers. Trade or manufacturer’s names appear herein solely because they are considered essential to the object of this report.

Tel8 History & Overview

Background

The Tel8 Pooled Fund Study was created in 1994 to support the development of a telecommunications system dedicated to improving and enhancing transportation in the Federal Highway Administration (FHWA) Region 8. TEL8 established a partnership among the region’s Departments of Transportation (DOT) and four Mountain Plains Consortium (MPC) transportation research universities. The structure of the pooled fund study required each of the participants to provide financial contributions to the study. The TEL8 established by-laws and elected a board of directors to govern the system and establish a network control center at North Dakota State University (NDSU) to manage the administrative, technical and programming functions of the network.

The TEL8 system included video conference facilities at each of the original sites and a satellite-based transmission medium connecting the network. During the 1990s, TEL8’s original network topology included a satellite-based transmission medium and CLI videoconference codecs. In the late ‘90’s Tel8 undertook a major reconfiguration of its videoconference technology and network technology when the entire system was switched from a satellite-based transmission medium to a terrestrial-based T1 private network. At the time an analysis of the potential transmission mediums indicated that TEL8 would benefit from purchasing and operating its own videoconference bridge. A bridge was installed at NDSU, the Network Control Center, under the satellite-based transmission medium.

The TEL8 system was improved and enhanced with evolving technology and programming through the 1990s. In May 1999, Interim Report No. RPR-0003(025) was issued. It was the final report covering the TEL8 research efforts and results of the telecommunication network for the decade of the 1990s.

TEL8’s cost structure originally involved shared costs across all system expenses. After the switch from the satellite-based transmission medium to the terrestrial-based transmission medium, TEL8 developed a new cost structure with shared and individual site costs.

With the foundation established in the 1990s, the TEL8 Pooled Fund was positioned to move into the 21st Century to achieve it mission and goals.

The TEL8 Mission:

*To contribute to quality transportation in Region 8 through a distance learning and teleconferencing network that serves the participating DOT’s and universities by enhancing communications, education, technology transfer, and research.*

Although technology and programming have evolved, the original mission remains relevant.

TEL8 HIGHLIGHTS OF YEARS 2000-2002

The TEL8 Pooled Fund Study was renewed for the two-year period of 2000-2002. In September 2000, Final Report No. SPR-0003(025) was issued covering the TEL8 Pooled Fund expansion, growth and priorities of that period. During that time, each development met the technical training needs or research dissemination requirements of its members. Programming performance measures were established to evaluate the efficiency of network programming and the programming committee, responsible for the network programming, assumed greater visibility in the organization. In September 2002, Interim Report No. SPR-0003(099) was issued, again chronicling the growth and evolution of the videoconference technology and programming for that period through 2002.

1. Members

The following nine transportation organizations participated in the system during 2000-2002:

* Wyoming Department of Transportation
* South Dakota Department of Transportation
* University of Wyoming
* Utah Department of Transportation
* North Dakota Department of Transportation
* Colorado State University
* Montana Department of Transportation
* University of Utah
* North Dakota State University

1. Programming

During the 2001 programming period, 407 programming hours were offered with 1,049 people participating in video conferences. During the period of 2002, 451 hours of programming were offered with 1,112 people participating. People-hours on the system increased from 6,012 during 2001 to 7,123 during 2002.

TEL8 programming during that period also stimulated the development of a proposal to expand TEL8’s InfoX (a DOT-sponsored information exchange seminar series) and TransX programs across additional states in the western United States. TEL8 programming also drew upon the partnership between state DOT’s and MPC universities to facilitate the transfer of new and cutting edge research and technology.

During this two-year period the following programming was offered culminating in 71 events offered during 2001 and 96 events offered during 2002:

* Leadership Development Institute Workshops
* MPC Short Courses
* Franklin Covey Workshops
* InfoX Sessions
* NHI Course (SuperPave)
* TransX Sessions
* Graduate Classes
* MPC-X Sessions
* Monthly InfoX and TransX Events
* MPC Courses and Special Event

1. Technology Infrastructure

The Tel8 sites operated a video conference network connecting over 30 individual sites including a video conference bridge which provided system connectivity. Network expansion continued with additional DOT district sites connecting to the system. Cascading two or more bridges connected together to increase the number of ports available for a specific video conference was just being explored. By the end of FY ’02, TEL8 had bridging capacity to connect sites together with full duplex audio at 384k bits per second and 30 frames per second. However, TEL8 began exploring how to expand the bridge beyond the limitation of 11 ports and purchasing a new bridge was considered.

1. Finances

For the two-year period of FY ’00 to FY ‘02, TEL8’s total budget was $316,000.

TEL8 HIGHLIGHTS OF YEARS 2003-2004

In June 2004, the Utah Department of Transportation requested withdrawal from TEL8. [Did SD also leave this year?] A series of meetings were held to develop a business strategy for TEL8 in order to entice these states to return. The consensus was that there was great interest in the MPC technical training as well as other training that could cost-effectively be delivered over TEL8. A number of changes were made in the organization to be more responsive with the programming to the needs of the states. An Executive Group was added to the by-laws with authority to commit funds for their organizations. There was also general agreement that the name should be changed. In 2004, TEL8’s name was changed to the Transportation Learning Network.

1. Members

The following eight transportation organizations participated in the system during 2003-2004:

* Wyoming Department of Transportation
* North Dakota Department of Transportation
* South Dakota Department of Transportation
* Colorado State University
* Montana Department of Transportation
* University of Utah (through June of 2004)
* University of Wyoming
* North Dakota State University

1. Programming

During 2004, TEL 8 served 464 people and offered 348.5 hours of programming. Sixty-two events were offered including:

* Leadership Development Institute Workshops
  + Process Improvement Training
  + Developmental Leadership
  + Interpersonal Communications
  + Project Planning and Management
  + Providing Leading Edge Customer Service
  + Managing Stress
  + We’ve Got to Start Meeting Like This
  + Hiring Smart
* MPC Short Courses
  + P.E. Exam Preparation
  + Traffic Analysis Tools
  + Technical Writing
* Seven Habits Workshops
* FOCUS Workshops
* Brown Bag Videos
  + Power of Future Conversations
  + Power of Listening
  + Character is Destiny
  + Leadership and Self-Deception
* INFOX Sessions (11)
* TransX Sessions (16)

1. Technology Infrastructure

In 2004, the TEL8 Board of Directors authorized the issuance of an RFP to seek proposals for the replacement of the bridge which was then obsolete and could no longer be supported. At that point, it was nearly seven years old, twice as old as recommended for the technology. They were experiencing equipment malfunctions on a regular basis and their maintenance costs were significant. Five vendors responded with complete proposals and AVI was selected. AVI was selected because they could provide a complete solution and would take responsibility for the entire network. The network would be a closed network of T1 lines to each site with a 16-port bridge in a Tandberg configuration for IP only was to be provided.

1. Finances

In 2003, the total TEL8 budget was $247,410. In 2004, the name was changed to the Transportation Learning Network (TLN) and its budget was $267,450.

TLN HIGHLIGHTS OF YEARS 2005-2006

As mentioned, an RFP for the acquisitions of new equipment/network was issued in 2004 and a vender was selected at the end of that year. On January 31, 2005, a new private network was installed at a total purchase price of $355,669,98; with lease payments to be made during the following three fiscal years at FY05 = $54,758.42; FY06 = $163,475.85; and FY07 = $163,475.85.

1. Members

The following seven transportation organizations participated in the TLN system during 2005-2006:

* Wyoming Department of Transportation
* North Dakota Department of Transportation
* South Dakota Department of Transportation
* Colorado State University
* Montana Department of Transportation
* University of Wyoming
* North Dakota State University

1. Programming

During 2005 programming period, 74 events were held with 312.5 hours of programming and 836 people were served. During 2006, 89 events were held with 417 programming hours offered and 765 people participating in video conferences. The Programming Schedule included:

* Leadership Development Institute Workshops
  + Process Improvement Training
  + Developmental Leadership
  + Interpersonal Communications
  + Project Planning and Management
  + Providing Leading Edge Customer Service
  + Managing Stress
  + We’ve Got to Start Meeting Like This
  + Hiring Smart
* MPC Short Courses
  + P.E. Exam Preparation
* Seven Habits Workshops
* FOCUS Workshops
* Brown Bag Sessions
  + Power of Future Conversations
  + Power of Listening
  + Character is Destiny
  + Leadership and Self-Deception
  + Balancing Personal and Professional Roles
  + Managing Minutiae: Voice-Mail
  + Building and Integrating and Effective Planning Systems
  + Defining Personal and Professional Visions of Success
  + Managing Minutiae: E-Mail
  + Handling Crises Effectively
  + Unleashing the Power of Your Planner
* Info X Sessions
* TransX Sessions
* Graduate Classes
* MPC Technical Training
  + MUTCD Changes
  + Ride Preservation
  + Regional ITS Architecture
  + Pavement Preservation
* SURTC Transit Workshops
  + Marketing on a Shoestring Budget

1. Technology Infrastructure

As mentioned, a new network was brought online in early 2005. It would use exclusively internet protocol and would be a closed network of T1 lines to each site with a 16-port bridge in a Tandberg configuration. Each videoconference site consisted of in-room video and audio equipment that received and transmitted live pictures and sound. Each site was capable of participating in individual point-to-point or system-wide videoconferencing. In 2006, TLN acquired the capability to record videoconferences and stream them over the Internet for viewing at computer desktops as well as for later retrieval. This was accomplished through a piece of equipment called the Content Server, which was available to all TLN members.

1. Finances

In 2005, TLN management felt that expenses were less than expected due to the disruption to the organization from the departure of South Dakota and the changeover to new equipment/network. In 2005, total TLN operating costs were $222,834 with the bridge payment in 2005 comprising $54,758.42 of that costs.

In 2006, total expenses were $426,374 with the bridge payment comprising $163,475.85 of that total. Management was happy to report that with the new technology, total network operating costs dropped from $96,000 in 2005 to $63,321 in 2006.

TEL8 HIGHLIGHTS OF YEARS 2007-2008

In 2007 the TLN understood that the future sustainability of the program depended on TLN understanding the training needs of its DOT sponsors and adapting its offerings to meet those needs. Over the two-year period of 2006 -2007, TLN began to shift its focus to place more emphasis on technical training to respond to an identified deficiency in its programming, and also on close communication and cooperation with the DOTs. This is evidenced in its programming during the 2007-2008 period. Significant website, technical and programming accomplishments were made during 2008.

1. Members

In 2008, South Dakota State University was added to the TLN. Also that year, TLN began coordinating with LTAPs in ND, SD and WY. SDDOT began expressing interest in rejoining TLN but did not during this period. The following eight transportation organizations participated in the system during 2007-2008:

* Wyoming Department of Transportation
* North Dakota Department of Transportation
* Montana Department of Transportation
* Colorado State University
* University of Utah
* University of Wyoming
* South Dakota State University
* North Dakota State University

1. Programming

During the 2007 programming period, 3,794 people participating in 172 TLN events and in 2008, 5,022 people participated in 202 events—a 32% increase. The following TLN and MPC events were held:

* Leadership Development
  + Core Learning
  + Crucial Conversations
* Concrete Series
* MPC Short Courses
  + Airport Planning & Design
  + Pavement Materials
  + Technical & Business Writing
  + Statistics Made Simple
  + PE Exam Review
  + Scientific Methods
* MPC Graduate Courses
  + Advanced Traffic Signal Systems
  + Intermediate Design of Wood Structures
  + Public Transportation
* Professional Development Courses
* Franklin Covey Events
  + Seven Habits
  + Focus
  + Maximizer
  + Brown Bags
* Personal Finance Series
* Miscellaneous Events
  + NHI Work Zone safety for Maintenance Ops
  + MPC Signs, Retro-reflectivity and Retro-reflectometers
  + MPC Low Cost Safety Improvements
  + Expanded Polystyrene (EPS) Geofoam
  + PGS Machine Control
  + Asphalt Zipper

1. Technology Infrastructure

In 2007, technical accomplishment included the installation of a content server, upgrades to codec, MUC, and TSM software and the installation of SDSU equipment. Also in 2007, the TLN web site was redesigned and new features were added including the ability to print TLN certificates, web-based participant lists, enhanced reporting by site, dates and training event and adding an “upcoming events” on the home page. Additionally, in 2008 much time and effort was spent on identifying the needs and requirements of a learning management system (LMS). After researching the cost of off-the shelf LMS’s, TLN pursued and installed the open-source LMS Moodle in September 2007. However, it had some limitations for which the staff explored customized solutions involving another piece of open-source software.

1. Finances

The actual TLN costs for 2007 were $541,554. In FY ’08, SDDOT was not in the budget and TLN staff made a concerted effort to hold down costs. The TLN actual expenses for FY ’08 were $271,688.

TEL 8 HIGHLIGHTS OF YEARS 2009-2010

1. Members

In 2009, Montana Department of Transportation departed the TLN and late 2010, South Dakota Department of Transportation rejoined the TLN. The following eight transportation organizations participated in the system during 2009-2010:

* South Dakota Department of Transportation
* Wyoming Department of Transportation
* North Dakota Department of Transportation
* Colorado State University
* University of Utah
* University of Wyoming
* South Dakota State University
* North Dakota State University

1. Programming

In 2009, 3,073 registrants participated in TLN events with 373 hours of programming offered. 2010, In The following courses were offered:

* PE Exam Review
* Personal Finance: Kids and My Money
* Graduate Course: Public Transportation
* Improving Your Ability to deal with Conflict
* Franklin Covey Brow Bag: Team Building
* FOCUS Achieving Your Highest Priorities
* Pipe for Life
* Work Zone Traffic Control for Maintenance Operations
* Personal Finance: Making Good Benefits Choices
* Franklin Covey: Seven Habits of Highly Effective People
* Seal Coat Workshop
* Micro Surfacing/Slurry Seals
* Cold In-Place Recycling/ Full-Depth Reclamation
* RAP (Reclaimed Asphalt Pavement)
* ATSSA Traffic Control Technician’s Course
* Seven Habits Maximizer
* Gravel Roads Workshop Leading a Successful Change Effort
* Personal Finance; Risk Management
* Franklin Cove Brown Bag: 5 Questions Every Leader Must Ask
* Focus
* Personal Finance: Advanced Savings and Investing for When Times are Tough
* Asphalt – Best Practices in Production

1. Technology Infrastructure

In 2010, enhancements were made to the LMS. LearnFlex was added to enhance registration, learning plans, achievement tracking and advancement of online training modules. Also in 2010, Instant Presenter was added to allow the distribution of training for desk to desk via webinars. During 2010, TLN could connect to most video-conference locations worldwide that had an IP connection. A total of 30 sites were connected on a regular basis. Eight core connections were directly on TLN’s private, dedicated videoconference network. In 2011, webinar capabilities were added to free viewers and speakers from the requirements of attending at a video conference site, allowing them to interact from their own PC’s. Most presentations were warehoused on a content server.

1. Finances

In 2009, the total TLN budget was $390,988 and in 2010 it was $396,246.

TEL8 HIGHLIGHTS OF YEARS 2011-2012

1. Members

TLN continued coordinating with LTAPs in ND, SD and WY. In 2011, a new executive structure was created with DOT’s represented but the MPC universities were replaced by the MPC Director and NDSU. Executive Board Meetings were held twice per year, with only one being in person. These changes were made to reduce costs of operation. The following nine transportation organizations participated in the system during 2011-2012:

* South Dakota Department of Transportation
* Wyoming Department of Transportation
* North Dakota Department of Transportation
* Colorado State University
* University of Utah
* University of Wyoming
* South Dakota State University
* North Dakota State University

1. Programming

In FY ‘11, 1,588 attendees participated in video conferences and 171 participated in webinars, in total 1,759 participants attend TLN events. The following events were offered:

* Breaking through the Barriers: Core Skills for Interpersonal Communication
* Cold-in-Place / Full Depth Recycling
* Design & Construction of Full Depth Reclamation Bases with PCC
* Erosion & Sediment Control
* Geosynthetic Reinforced Soil Integration Bridge System
* Gravel Road Maintenance
* Micorsurfacing/Slurry Seals
* OSHA Work Zone Safety
* Seal Coat Workshop
* Seven Habits of Highly Effective People
* Snow & Ice Control
* Solid & Hazardous Waste Issues, Ideas & Resources
* Warm Mix Asphalt
* Traffic Control for Workers in Construction Zones
* Traffic Control for Supervisors
* Composite Concrete Pavements – Wet on Wet
* Performance of Recycled Asphalt Pavement in Gravel Roads
* PE Review for Civil Engineers
* Prefabricated Bridge Elements and Systems
* Making Meetings Work

1. Technology Infrastructure

In 2011, the TLN staff began having discussion of how to develop a back-up for the aging communication bridge. They also undertook the development of building marketing of on-demand resources into the LMS, developing a training aids library and investigating mobile learning. They also began to categorize training modules and model NHI knowledge levels definitions. They updated the TLN Website and a training calendar linked to the LMS. In 2012, TLN operated with a non-warranty supported Tandberg Bridge. Tandberg was acquired by Cisco and discussions were held for pursuing a grant with Polycom, the system used by NDDOT and South Dakota.

The TLN website was rewritten in 2012 to streamline the advertisements and registration process. The website provided an advertising window for upcoming and past recorded training. It gave links to the course descriptions within the LMS. A link from the web site to the LMS for registration was created. The website information was maintained by the TLN staff but any modifications to the actual website format were covered by UGPTI at no cost.

1. Finances

In 2011, the total budgeted amount was $557,060. This reflected high costs in IT service support due to aging technology infrastructure. The budget for 2012 was $465,000, which included $10,000 contingency for rental costs for a failed bridge. Prior to September of 2012, the TLN program had benefited from a 2008 grant titled the Transportation Education Development Pilot Program (TEDPP). This grant paid for part of the costs of the learning management system and part of the salaries of staff working on the development of online modules. In the past budget, 40 percent of the LearnFlex learning management system licensing costs were covered by TEDPP. A request was submitted to FHWA to extend the 2008 TEDPP program for an additional 3 years but the request was not granted. The 2012 budget was based upon TLN paying the full amount of the LearnFlex licensing minus costs to be assigned to NDDOT for NDDOT only courses.

TEL8 HIGHLIGHTS OF YEARS 2013-2014

1. Members

In 2013, TLN had regained Montana DOT and picked up four MPC universities. Members of TLN included the following 12 members:

* Montana Department of Transportation
* South Dakota Department of Transportation
* Wyoming Department of Transportation
* North Dakota Department of Transportation
* Colorado State University
* University of Utah
* University of Wyoming
* South Dakota State University
* North Dakota State University
* University of Colorado – Denver
* University of Denver
* Utah State University

1. Programming

In 2013, 32 video conference events and 10 webinars were offered by TLN, serving 3,061 participants. In 2014, 3,771 participants took part in 49 video conferences and webinars. This growth year-over-year was largely attributable to the addition to Montana DOT and four additional MPC universities.

A fair amount of time during this period was used by staff to educate speakers to prepare them for the use of the webinar or video conference equipment. An online training module was developed to allow them to have advanced information on how to conduct a video conference. NHI has adapted the module to their format for training its speakers in advance of video conference presentations. The training module included suggestions for PowerPoint formatting to enhance the viewing experience.

The following events were offered during 2014, some were offered more than once during the training season:

* Hiring Smart
* PE Review for Civil Engineers
* Presentation Slide Design for Non-Designers
* The People Side of Management
* Slide Design for Non-Designers Follow-Up
* Snowplow Operator Training
* Delivering Leading Edge Customer Service
* Ethics Awareness for the Transportation Industry
* Anti-Icing/De-Icing
* Stepping Up: Taking the Initiative
* Successful Meetings or Trainings Using Distance Technology
* Alternatives to Paving
* OSHA 10-Hour Work Zone Safety
* Leading a Successful Change Effort
* PE Review for Civil Engineers
* Access Management
* Basic Concepts of Pavement Preservation
* Managing Organizational Communication
* Developing Personal Leadership
* The Flexible Leader
* Guardrail Maintenance
* Basic Full Depth and Partial Depth Concrete Pavement
* ATSSA Traffic Control Technician
* Building Credibility and Influence
* Highway Wildlife Crossings – State of Practice
* State of the Guardrail Industry: Advancements in Longitudinal Barriers
* Bridge Construction Inspection
* Asphalt Crack Sealing
* Construction Guardrail Installation and Inspection
* Prose for Pros Writing Workshop
* Ultra-Thin Whitetopping Materials, Design and Construction Concepts
* Warm Mix Asphalt
* Pavement Markings for Maintenance Employees
* ADA – Designing Construction & Maintaining Pedestrian Facilities
* Introduction to Project Management Concepts
* Construction Project Management/Contract Administration
* Dealing with Difficult People
* Tractor Operator Safety
* Highway Pipe Installation
* Basic Full Depth and Partial Depth Concrete Pavement Repair Methods
* Shale Oil Exploration & Production Impacts on Roads
* Concrete Slab & Bridge Deck Curing
* Big Block Segmental Walls
* Automated Pavement Distress Data Collection
* Gravel Roads Maintenance
* Franklin Covey 7 Habit of Highly Effective People

1. Technology Infrastructure

The Tandberg video conference bridge was replaced in 2014. A Polycom Video Conference Bridge system similar to the systems of the member states was selected. The new system was installed in February of 2014. Some technical issues arose in the fall of 2014. Issues with frozen slides were studied extensively and work-arounds were found.

1. Finances

The budget for 2013 was $548,000. In FY ’14, the budget included $80,000 down payment on a video conference bridge. TLN was able to participate in an NDSU finance options (loan) to pay the balance over two years. The budget covered the second payment of $28,000 with the their and final payment scheduled to be made during the FY ’16 budget

TEL8 HIGHLIGHTS OF YEAR 2015

1. Members

In 2015, members of TLN included the following 12 members:

* Montana Department of Transportation
* South Dakota Department of Transportation
* Wyoming Department of Transportation
* North Dakota Department of Transportation
* Colorado State University
* University of Utah
* University of Wyoming
* South Dakota State University
* North Dakota State University
* University of Colorado – Denver
* University of Denver
* Utah State University

1. Programming

TLN staff developed a list of learning opportunities based on priorities determined by the 4-state members of the TLN. Starting in July, staff began writing descriptions, identifying speakers, and scheduling dates for the upcoming training season of September through May. TLN also had 74 self-paced modules housed on the TLN learning management system. In 2015, a checklist was created for speakers and coordinators to ensure timely reminders of dates, deadlines and format. In late 2015, a TLN branded slide template was also produced for use in future presentations. In FY’15, 4,651 registrants attended a total of 42 video conferences and webinars and 12 registered viewings of recorded sessions. During this time, 548 participants had completed self-paced modules with 125 participants who were in-progress. The following video conferences were offered during FY’ 15:

* Breaking Through the Barriers—Core Skills for Interpersonal Communication
* Hiring Smart: Staffing for Optimum Performance
* NEPA
* Erosion Control Options
* Transition to Supervisor: Introduction to the Basics
* Pipe Repair Options
* Leadership Skills: Creating Success for your Team
* Asphalt Pavement Maintenance
* Global Positioning Systems
* OSHA 10-Hour
* Basic Concepts of Pavement Preservation
* PCC Joint Sealing and Resealing Methods
* Access Management
* Gravel Roads Maintenance
* 3-State Roundtable – Construction Survey and Grade Control
* 7 Minutes for Success and Team Building
* Conflict Management: The Not So Merry-Go-Round of Conflict
* Presentations for Power, Persuasions & Purpose
* Full-Depth Reclamation/Cement Stabilization
* Deciding How to Decide
* Delivering Leading Edge Customer Service
* Basic Sign Installation and Maintenance
* Route & Preliminary Survey and LiDar
* 3-D Modeling
* Presenting the Story of Your Data

1. Technology Infrastructure

LearnFlex is the learning management system used for advertising courses, accepting registrations, tracking training records and archiving past training for later recall. The addition of Montana DOT in 2013-14 resulted in a budget increase to accommodate a larger user license contract at a cost of $13,000 per year. Articulate was used for developing online modules but so software upgrades were budged for 2015. Instant Presenter was the webinar service acquired in 2010 and was still in use.

1. Finances

The budget for 2015-2016 was $548,000, the same as the two previous fiscal years.

SUMMARY

The Tel8 Pooled Fund Study was created in 1994 to support the development of a telecommunications system dedicated to improving and enhancing transportation through distance learning in the Federal Highway Administration (FHWA) Region 8. The TEL8 video conferencing system was used for technology transfer and technical training of member organizations. The TEL8 system included video conference facilities at each of the original sites and a satellite-based transmission medium connecting the network. During the 1990s, TEL8’s original network topology included a satellite-based transmission medium and CLI videoconference codecs. In the late ‘90’s, Tel8 undertook a major reconfiguration of its videoconference technology and network technology when the entire system was switched from a satellite-based transmission medium to a terrestrial-based T1 private network. The TEL8 system was improved and enhanced with evolving technology and programming through the 1990s. With the foundation established in the 1990s, the TEL8 Pooled Fund was positioned to move into the 21st Century to achieve its mission and goals.

During the 15-year period from 2000 to 2015, the TEL8 Program was renamed the Transportation Learning Network (TLN). During that time, membership fluctuated between eight and 12 state Departments of Transportation and Mountain Plains Consortium transportation research universities. At the close of this pooled fund, TLN had 12 members. The video conferencing technology evolved over this period of time into an internet protocol and used a closed network of T1 lines with each site being able to participate in point-to-point system wide videoconferencing. A Learning Management System and content server were added along with continual system and content upgrades. Robust technical training was enhanced with soft skill development programming which evolved over time to meet the changing needs of member organizations. Extensive on-demand training modules were also developed and hosted on the system. At the close of the Pooled Fund Study, nearly 50 technology transfer events were held each year with over 3,700 participants taking part in video conference and webinars; up from nearly 1,050 participants taking part in approximately one dozen events at the beginning of the 15-year period.