



NEBRASKA INFORMATION TECHNOLOGY COMMISSION

STANDARDS AND GUIDELINES

XX-XXX IP Communication Protocol Standard for Synchronous Distance Learning and Videoconferencing

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| Category | <b>Network Architecture</b>   |
| Title    | <b>IP Communication Protocol Standard for Synchronous Distance Learning and Videoconferencing</b> |
| Number   | <b>XX-XXX</b>   |

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| Applicability | <input checked="" type="checkbox"/> <b>State Government Agencies</b><br><input checked="" type="checkbox"/> All..... <b>Standard</b><br><input type="checkbox"/> Excluding ..... <b>Not Applicable</b><br><input checked="" type="checkbox"/> <b>State Funded Entities - All entities receiving state funding for matters covered by this document..... Standard</b><br><input checked="" type="checkbox"/> <b>Other: Entities electing to pass synchronous video over Network Nebraska..... Standard</b><br><br><b>Definitions:</b><br><b>Standard</b> - Adherence is required. Certain exceptions and conditions may appear in this document, all other deviations from the standard require prior approval of <u>NITC Technical Panel</u> .<br><b>Guideline</b> - Adherence is voluntary. |
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| Status | <input type="checkbox"/> Adopted <input checked="" type="checkbox"/> Draft <input type="checkbox"/> Other:_____ |
| Dates  | Date: October 8, 2003<br>Date Adopted by NITC:<br>Other:  |

## 1.0 Technical Standard

All state agencies, entities that receive state funding for telecommunications, and entities that wish to pass synchronous video over the State's statewide network (*Network Nebraska*) shall use IP as their communication protocol for synchronous video.

## 2.0 Purpose and Objectives

The purpose of this standard is to implement a consistent communication protocol to be used by all entities wishing to pass synchronous, interactive teleconference video over the statewide network.

### 2.1 Background

IP is the Internet's most basic protocol. In order to function in a TCP/IP network, a network segment's only requirement is to forward IP packets. In fact, a TCP/IP network can be defined as a communication medium that can transport IP packets. Almost all other TCP/IP functions are constructed by layering atop IP.

IP is a datagram-oriented protocol, treating each packet independently. This means each packet must contain complete addressing information. Also, IP makes no attempt to determine if packets reach their destination or to take corrective action if they do not. Nor does IP checksum the contents of a packet, only the IP header.

IP provides several services:

- **Addressing.** IP headers contain 32-bit addresses, which identify the sending and receiving hosts. Intermediate routers use these addresses to select a path through the network for the packet.
- **Fragmentation.** IP packets may be split, or fragmented, into smaller packets. This permits a large packet to travel across a network, which can only handle smaller packets. IP fragments and reassembles packets transparently.
- **Packet timeouts.** Each IP packet contains a Time To Live (TTL) field, which is decremented every time a router handles the packet. If TTL reaches zero, the packet is discarded, preventing packets from running in circles forever and flooding a network.
- **Type of Service.** IP supports traffic prioritization by allowing packets to be labeled with an abstract type of service.
- **Options.** IP provides several optional features, allowing a packet's sender to set requirements on the path it takes through the network (source routing), trace the route a packet takes (record route), and label packets with security features.

In the two decades since their invention, the heterogeneity of networks has expanded further with the deployment of Ethernet, Token Ring, Fiber Distributed Data Interface (FDDI), X.25, Frame Relay, Switched Multimegabit Data Service (SMDS), Integrated Services Digital Network (ISDN), Asynchronous Transfer Mode (ATM), and most recently Multi Protocol Label Switching (MPLS). The Internet protocols are the best-proven approach to internetworking this diverse range of LAN and WAN technologies.

The Internet protocol suite includes not only lower-level specifications (such as TCP and IP), but specifications for such common applications as electronic mail, terminal

emulation, and file transfer. The Internet protocols are the most widely implemented multi-vendor protocol suite in use today. Support for at least part of the Internet protocol suite is available from virtually every computer vendor.

IP multicasting (the ability to send IP datagrams to multiple nodes in a logical group) is an important building block for applications such as video. Video teleconferencing, for example, requires the ability to send video information to multiple teleconference sites. If one IP multicast datagram containing video information can be sent to multiple teleconference sites, network bandwidth is saved and time synchronization is closer to optimal.

## **2.2 Objective**

The objective of this standard is to permit interoperability of distance learning systems throughout the state. When all have adopted this and other standards prescribed by the state, educational opportunities will be expanded because any entity will be able to share resources with any other entity. All such traffic will be able to pass through *Network Nebraska* backbone connectivity, and the aggregated use of this network will lower overall costs for participants.

## **3.0 Definitions**

### **3.1 Synchronous**

Occurring at the same time. When applied to video, it means that two or more parties in different locations are conducting a simultaneous audio/video exchange over the network.

### **3.2 Teleconference**

Video traffic where participants at separate locations communicate at the same time with one another through video and/or audio links.

### **3.3 TCP/IP**

A protocol for communication between computers, used as a standard for transmitting data over networks and as the basis for standard Internet protocols. *Transmission Control Protocol/Internet Protocol*.

## **4.0 Applicability**

### **4.1 State Government Agencies**

All State agencies are required to comply with this standard.

### **4.2 State Funded Entities**

Entities that are not State agencies but receive State funding for telecommunications (i.e. Legislative appropriations, Education Innovation Fund, Nebraska Universal Service Fund, ESU Core Services, Infrastructure Fund, etc.) are required to comply with this standard.

### **4.3 Other Entities**

Entities that are neither State agencies nor state-funded entities but choose to use the State-funded *Network Nebraska* for purposes of transmitting or exchanging synchronous video must comply with this standard.

## **5.0 Responsibility**

### **5.1 NITC**

The NITC shall be responsible for adopting minimum technical standards, guidelines, and architectures upon recommendation by the technical panel. (N.R.S. 86-516 §6)

### **5.2 *Network Nebraska* Operational entities**

The Collaborative Aggregation Partnership, composed of the University of Nebraska Computer Services Network, the Department of Administrative Services--Division of Communications, and Nebraska Educational Telecommunications, will be responsible for sharing the responsibilities of the network operations portion of *Network Nebraska*. The responsibility for identification and mitigation of non-compliant entities with respect to the IP communication protocol standard resides with the Collaborative Aggregation Partnership.

## **6.0 Related Documents**

### **6.1 Video and Audio Compression Standard for Synchronous Distance Learning and Videoconferencing**

([http://www.nitc.state.ne.us/standards/video/video\\_standard.pdf](http://www.nitc.state.ne.us/standards/video/video_standard.pdf))