9. Comparison with IS-IS

The basis of the NLSP™ design is the ISO OSI IS-IS standard (Reference [ISO92]). IS-IS was designed for ISO OSI CLNP, but NLSP is for the Novell® IPX™ protocol. This section summarizes the key differences between NLSP/IPX and IS-IS/CLNP. The current version of NLSP, as described in this document, is the basis for comparison.

9.1. Terminology in the Specification Document

IS-IS/CLNP	*NLSP/IPX*
Intermediate System.	Router.
End System.	End node. (Examples of end nodes are desktop client workstations and nonrouting servers.)
Protocol Data Unit.	Packet.
Subnetwork.	Network.
Network.	Internetwork.

9.2. Addressing Issues

IS-IS/CLNP	*NLSP/IPX*
The Network layer address, or NSAP, is variable in length, up to 20 bytes. For routing purposes, it has a variable-length Area Address, a one- to eight-byte ID field, and a one-byte Selector. The Selector identifies a software entity within the system.	The Network layer address is fixed at 12 bytes. It consists of a four-byte network number, a six-byte node number, and a two-byte socket field. The socket identifies a software entity within the system.
Each router has at least one area address. The maximum number of area addresses for an area is three or more (the number is configured uniformly in an area).	NLSP allows area addresses to be used. The maximum number of area addresses for an area is three. The default area address if all networks are in one area is (area = 0, mask = 0).
Each Manual Area Address is represented as a length-preceded NSAP prefix; that is, the leading bytes of the NSAP. It has one-byte granularity.	Each Manual Area Address is represented as pair of four-byte numbers. The first is an IPX network number; the second is a mask of leading one bits indicating how long the area identifier is. It is variable-length with one-bit granularity.

Each router has a unique system ID. The system ID is 1 to 8 bytes (the size is configured uniformly in an area).	Each router has a unique system ID. The system ID is 6 bytes. Each router also has a unique internal network number and a textual name.

9.3. Routing Issues

IS-IS/CLNP	*NLSP/IPX*
Systems use information about links to routers and end nodes to determine routes to routers and to end nodes.	Systems determine routes to IPX network numbers, and determine services reachable at those network numbers.
Includes Level 1 and Level 2 routing.	Includes specification of Level 1 routing and (for forward compatibility) supports routing to the nearest Level 2 router.
A router supports one to four routing metrics.	There is one routing metric: "Cost."
LSPs are sent only on LANs having adjacencies with the sending router.	LSPs are sent on a LAN even if there are no adjacencies on the circuit in question.
When a LAN circuit changes state to "Up," a system waits 2 × bcastHelloInt before electing a Designated Router on that circuit.	When a LAN circuit changes state to "Up," a system waits 2 × drBcastHelloInt before electing a Designated Router on that circuit. However, if in this time an adjacency is formed to a system on that LAN, and that system reports that it is the Designated Router itself, the Designated Router election process is run at once.
Priority is not affected by overload status.	Priority of becoming Designated Router is reduced when in LSP overload state.
The priority to become Designated Router on a LAN is configurable, per router per LAN attachment.	The priority to become Designated Router on a LAN is configurable, per router per LAN attachment. The default is 44. If a system elects itself Designated Router, it raises its priority by 20.
Level 1 LSPs describe links to other routers, and to end nodes.	Level 1 LSPs describe links to other routers, to external routes, and to services. NLSP also includes a management information field that contains the router's name and IPX internal network number.

Does not include extra measurements or management information.	Includes Throughput, Delay, MTU Size, and Media Type in LSPs. The first three of these also enter into load-splitting decisions.
Each LSP's IS Neighbors option can contain multiple neighbors.	Each LSP's Link Information option describes one neighbor and the link connecting to it.
The maximum size of sequence number packets and Hello packets is configurable.	The maximum size of sequence number packets and Hello packets is determined dynamically per circuit.
Comparison of LSPs for newness considers sequence number and remaining lifetime.	In addition to sequence number and remaining lifetime, comparison of LSPs for newness considers the checksum. The *preference of checksums* rule makes resolving LSP confusion operate the same way for equal and unequal sequence numbers.
On wraparound of an LSP sequence number, the router is disabled for a period.	On wraparound of an LSP sequence number, the specific LSP is purged for a period, but the router can (optionally) continue operation.
No backward compatibility needed.	Includes backward compatibility features for RIP and SAP. Includes WAN pseudonodes.
The originating lifetime of an LSP is 20 minutes.	The originating lifetime of an LSP is 120 minutes.

9.4. End Node Support

IS-IS/CLNP	*NLSP/IPX*
Uses the ES-IS protocol.	Uses RIP and SAP.
Can route data traffic reliably to an end node attached to a partitioned LAN.	Cannot route data traffic reliably to an end node attached to a partitioned LAN, because NLSP routes to IPX networks (not individual end nodes).

9.5. Data-Link Issues

IS-IS/CLNP	*NLSP/IPX*
Assumes that a router detects remote startup of a WAN link. Also assumes that failure of data delivery results in circuit disconnect.	Includes a state machine in establishing WAN circuits, to support unreliable datagram data links.

Hello messages are padded to maximum configured size (or one byte less) to ensure adjacencies are formed only between routers that can communicate fully.	MTU Size is included in Hello messages, enabling packets to be sent as large as possible, without overrunning the receiver's buffer.
Specifies pacing of packet transmissions to avoid overrunning receivers' capacity to handle traffic bursts.	Pacing of PDU transmissions vary in detail from IS-IS.
Uses multicast on a LAN.	Uses multicast on a LAN, with provision to revert to broadcast if there is a router that does not support multicast.
Includes specification of operation over X.25 and IEEE 802.x networks.	Includes specification of operation over X.25 and IEEE 802.x networks, but also operates over other LAN media, and over other WAN media using IW2 (of which X.25 support is one example).

9.6. System Integrity Issues

IS-IS/CLNP	*NLSP/IPX*
If a router receives an LSP with a bad checksum, it does an area-wide purge of the LSP.	If a router receives an LSP with a bad checksum, it generates an event and discards the LSP.
Includes optional authentication specification.	Does not include authentication.
Partial precomputation of LSP checksums is required.	Partial precomputation of LSP checksums is optional.

9.7. Packet Format and Framing

IS-IS/CLNP	*NLSP/IPX*
Routing packets are transmitted directly over the data-link layer.	Packets are transmitted with IPX headers.
Routing packets have a fixed part and a set of variable-length option fields.	Routing packet formats are very closely based on those of IS-IS. The fixed part of the NLSP packet is the same length as the IS-IS packet. Some fields that are reserved in IS-IS are used in NLSP; for example, the State field in the WAN Hello packet and the No Multicast bit in the LAN Hello packet. Some fields used in IS-IS are reserved in NLSP; for example, the IS-IS ID Length and Maximum Area Addresses fields do not apply to NLSP because these parameters are fixed.

LSP buffer size is 1492 bytes.	LSP buffer size is 512 bytes, but can be configured.

9.8. System Management

IS-IS/CLNP	*NLSP/IPX*
System Management is specified in GDMO notation.	System Management is specified in concise MIB form for SNMP.