

OVERVIEW

The Novell protocol, known as NetWare, uses the Internetwork Packet Exchange (IPX) protocol at the network layer to route packets. For interface to third-party applications, the Sequenced Packet Exchange (SPX) transport layer protocol is provided. Novell uses NetWare Core Protocol (NCP) at the session layer to manage IPX connections and make procedure calls to access operating system resources. The NetWare File Sharing Protocol (NFSP) is used for standard NetWare server file and printer sharing, while the application layer Service Advertising Protocol (SAP) is used to distribute information about server type and availability to NetWare hosts.

NOVELL IPX NETWORK LAYER

The Novell IPX protocol is essentially identical to the XNS IDP protocol.

Novell IPX Parameters

The Novell Internetwork Packet Exchange protocol parameters are as follows:

- **Destination Network (DN)** — The four-byte address of the destination network, zero if on the local network.
- **Destination Socket (DS)** — The two-byte socket number of the destination port.
- **Source Network (SN)** — The four-byte address of the source network.
- **Source Socket (SS)** — The two-byte socket number of the source port.

- **Hop Count (H)** — The hop count indicates the number of routers encountered during transport of the packet. Each router handling a packet increments the Hop count by one. When the Hop count reaches 16, IPX discards the packet.
- **Packet Type (Type)** — The number indicating the higher level protocol in use. Novell IPX defines the following packet types (Table 6-1).

Table 6-1: Novell IPX Packet Type

Packet Type	Protocol
0	Hello or SAP.
1	Routing Information Protocol.
2	Echo Protocol.
3	Error Protocol.
4	NetWare 386 or SAP.
5	Sequenced Packet Protocol.
17	NetWare 286.

NOVELL SPX TRANSPORT LAYER

The Sequenced Packet Exchange (SPX) is essentially identical to the XNS SPP protocol.

Novell SPX Parameters

NetSight Professional decodes Novell SPX frames into the following parameters:

- **Source Connection ID (SCID)** — The reference number used to identify the source end of a transport connection. This protocol establishes the Connection IDs at connect time to distinguish between multiple transport connections.
- **Destination Connection ID (DCID)** — The reference number used to identify the target end of a transport connection.
- **Sequence Number (SN)** — The sequenced number of the packet. Each successive packet transmitted and acknowledged on the transport connection must have a sequence number one higher than the previous sequence number.
- **Acknowledge Number (AN)** — The sequence number of the last packet that the sender received properly. Note that each side of the transport connection uses its own sequence of numbers for transmitted packets, resulting in sequence and acknowledge numbers in the same packet generally being out of phase.
- **Credit (CDT)** — The number of unacknowledged packets that the other side of the transport connection can send.
- **Connection Control Flags** — The bit fields, 1 if set, 0 if not set, are as follows:

SYS	If set, this protocol uses the packet for transport control.
ACK	If set, the sender requests an immediate acknowledgement.

ATT Attention bit, SPX does not use.

EOM If set, denotes logical end of a message stream.

- **Datastream Type (Type)** — Indicates the type of data found in the packet as follows:

0-253	Ignored by SPX; client can use.
254	End of Connection.
255	End of Connection Acknowledgement.

NOVELL NCP SESSION LAYER

The Novell NetWare Core Protocol (NCP) manages access to the primary NetWare server resources. NCP makes procedure calls to the NetWare File Sharing Protocol (NFSP) that services requests for NetWare file and print resources.

Novell NCP Frames

NetSight Professional first identifies the Novell NCP frames as one of the following (Table 6-2).

Table 6-2: Novell NCP Frames

NCP Command	Explanation
[request]	Request for NetWare server resources.
[reply]	Response from NetWare server.
[standby]	Server is processing the request.
[connect]	Request to create a NCP service connection.
[detach]	Request to terminate a NCP service connection.

Novell NCP Frame Parameters

Novell NCP frames contain the following parameters:

- **Sequence Number (SN)** — A code used to match NetWare requests with replies.
- **Connection ID (ConnID)** — A code identifying the current session.
- **Task Number (Task)** — A code used to refer to the current task.
- **Request Code (ReqCode)** — The code specifying the action requested of the server.
- **SubFunction Code (SubFn)** — The specific server function requested.
- **Error Status (Err)** — The error status for NCP replies.
- **Connection Status (Status)** — The connection status for NCP replies.

NOVELL NFSP PRESENTATION LAYER

The Novell NetWare File Sharing Protocol (NFSP) is the file and print sharing protocol of NetWare. NCP calls on NFSP to perform the functions associated with file sharing and printer management.

NetSight Professional decodes the Novell NFSP frames into a descriptive command for each server request, followed by parameters relevant to the command.

NOVELL SAP APPLICATION LAYER

Novell uses the Novell Service Advertising Protocol (SAP) to distribute service and routing information to hosts on the network. Every Novell server must broadcast its service information every minute and whenever requested by another host.

Novell SAP Frames

NetSight Professional classifies the Novell SAP packets as one of the following (Table 6-3).

Table 6-3: Novell SAP Frames

SAP Type	Explanation
[Server ID]	Provides service information.
[Get server ID]	Requests service information.

Novell SAP Server ID Frames

SAP Server ID frames provide the following information:

- **Response Type (RT)** — The type of service response as follows (Table 6-4).

Table 6-4: Novell SAP Response Type

Type	Response
2	General Service Response.
4	Nearest Service Response.

- **Service Type (ST)** — A service type number assigned by Novell.
- **Socket (S)** — The service listening port used by the server.
- **Hops (H)** — The number of router hops the SAP Server ID frame has made. The routing cost to reach the server.
- **Server Name** — The server name delineated in parentheses.

Novell SAP Get Server ID Frames

SAP Get Server ID frames contain the following information:

- **Query Type (QT)** — The Type of Service query as follows (Table 6-5).

Table 6-5: Novell SAP Query Type

Type	Query
1	General Service Query.
3	Nearest Service Query.

- **Server Type (ST)** — The service type of servers that must respond to the service query. The text "All" indicates a wildcard service request of FFFFh.