APPN™

Implementers Workshop

Frame Relay Boundary Access Node (BAN)

Eugene Cox
Senior Programmer
IBM Networking Hardware Division
PO Box 12195
RTP, N,C. 27709

(919) 254-5075
RALVM6(GENECOX)
genecox@vnet.ibm.com

Agenda

Current SNA to 3745/3746-900 technology (BNN).

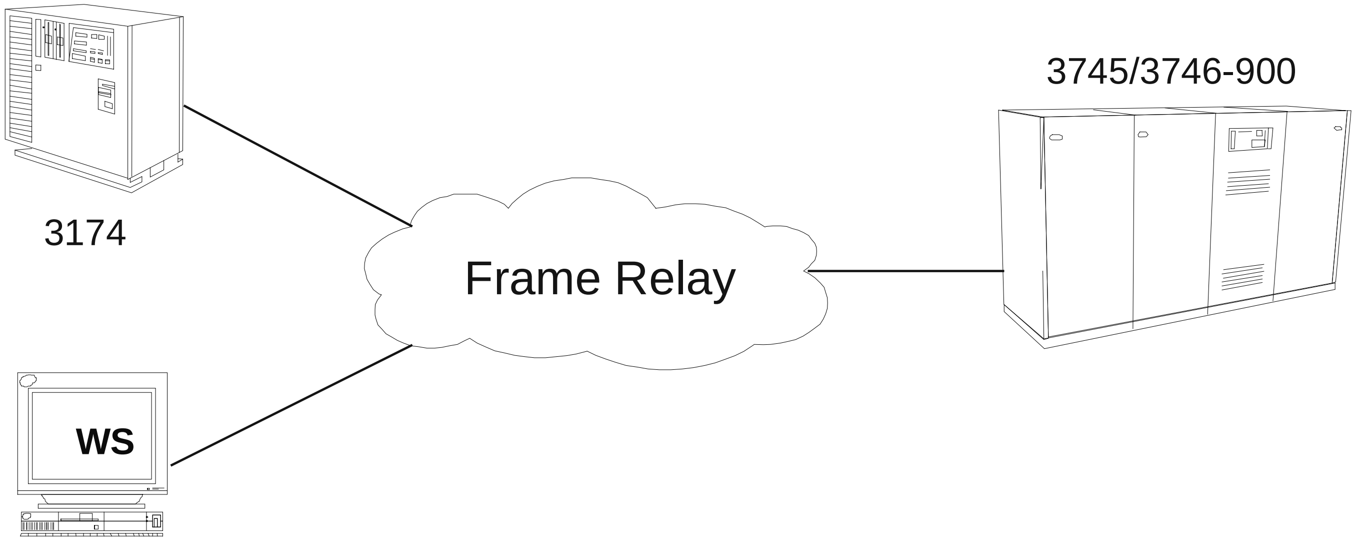
RFC 1490 frame format.

Used to transport traffic from LAN devices

- Multiple DCLI's
- SAP swapping
- DSPU

- Frame Relay BAN (Boundary Access Node).
  - RFC 1490 frame format
  - Advantages
  - BAN device functions
  - 3745/3746-900 functions
- Frame Relay BAN is NOT bridging

NCP V7R1 FR BNN



Existing Frame Relay BNN support in NCP V7R1 is well suited for attachment of native Frame Relay devices

Frame Format used is RFC 1490 Routed NLPID Protocol for Peripheral SNA

- defined in Annex F of ANSI T1.617a

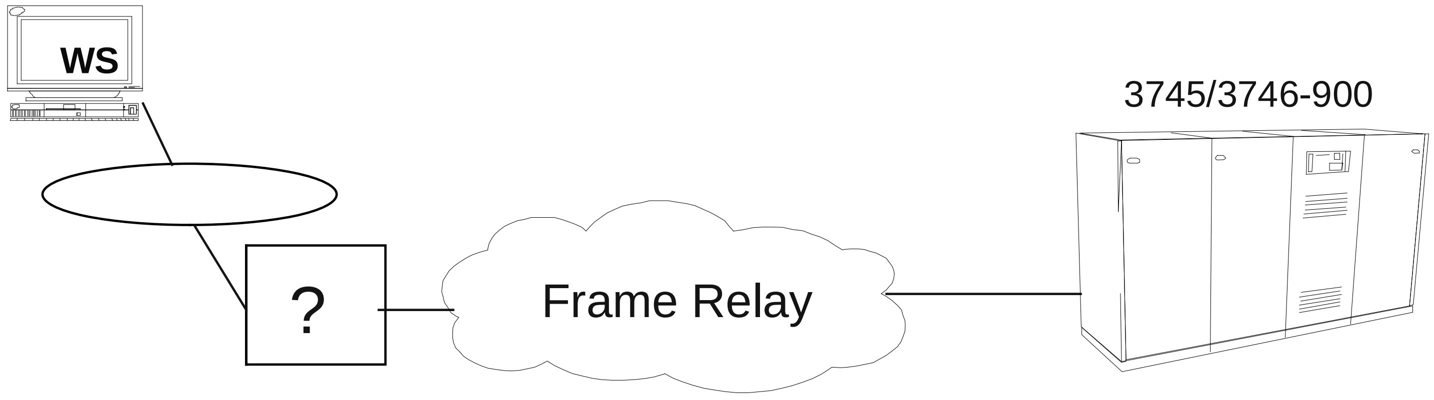
RFC 1490 SNA Routed Frame Format

Q.922 Address	
Control 0x03	NLPID 0x08 (Q.933)
0x4c (802.2)	0x80 (pad)
0x70 (user specified)	0x82 (SNA peripheral)
Destination SAP	Source SAP
802.2 Control (1-2 bytes)	
Remainder of LPDU	
Frame Relay FCS	

Source: Annex F of ANSI T1.617a

Only Layer 2 802.2 LLC addressing is available (SAP)

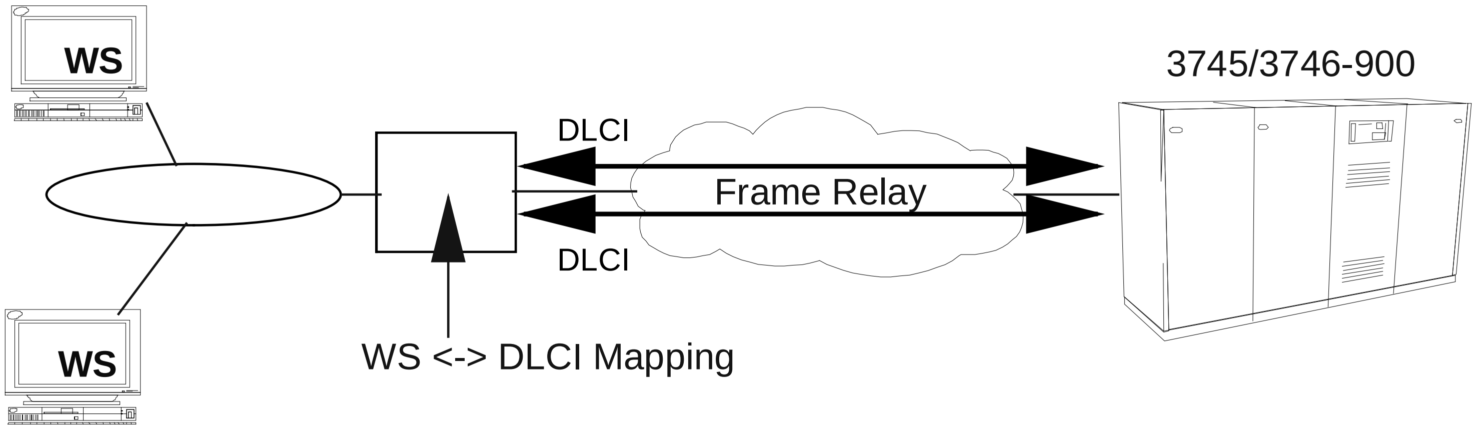
What about LAN attached devices ?



The RFC 1490 Routed Peripheral SNA Frame format is not well suited for communication with LAN devices due to the lack of any layer 2 addressing.

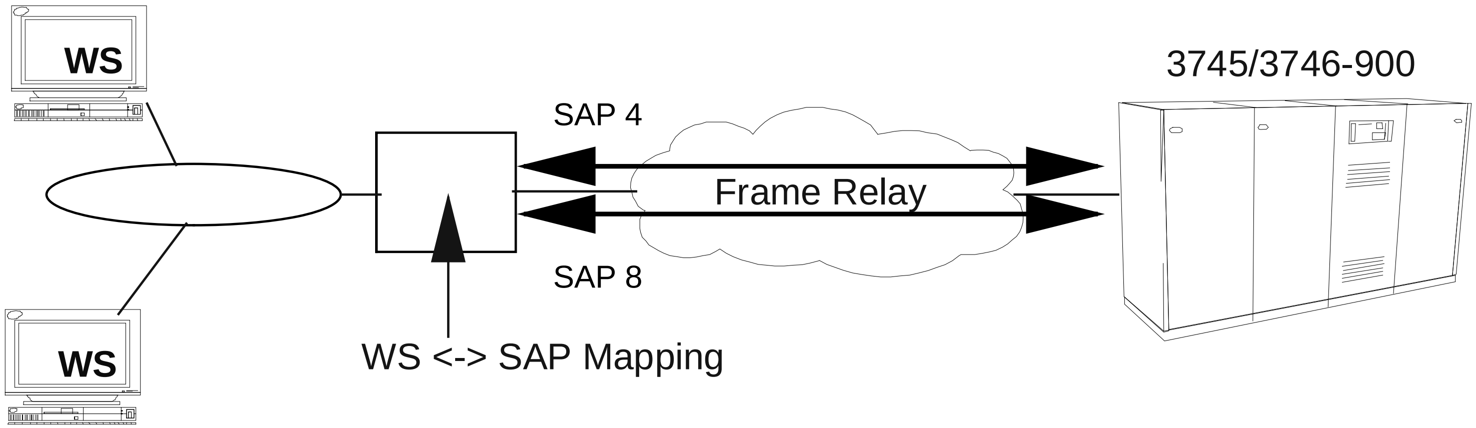
i.e. No MAC layer address

Multiple DLCI's



- FR BNN implementations often associate each station to a FR PVC.
- Adding/Deleting/Moving connections may require sysdef in the access device & carrier network required to create and maintain the associations.
- Cost of 1 DLCI per SNA station

Multiple SAP's



Multiplexing is also possible with BNN by using multiple station SAP's within a DLCI.

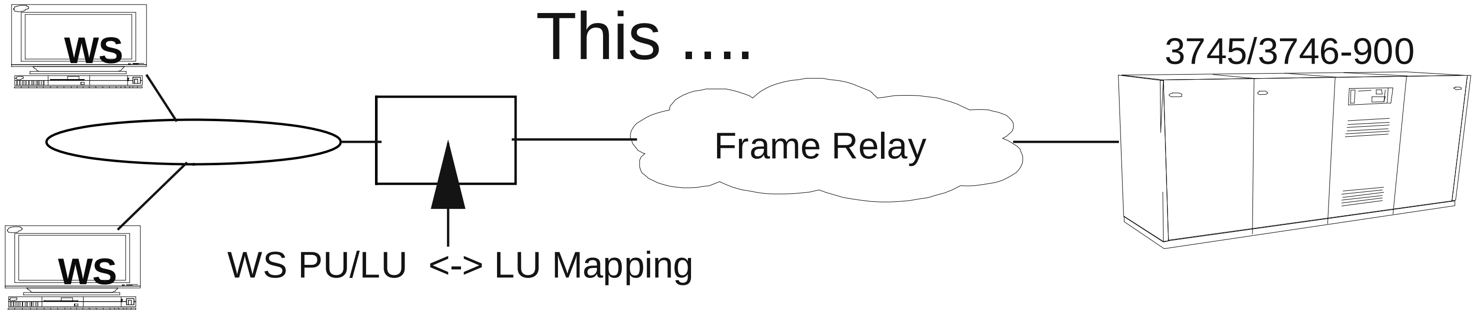
- Supported by NCP/3745 only
- Limit of 127 stations per DLCI
- Call out from NCP is tricky (null sap)

Sysdef intensive

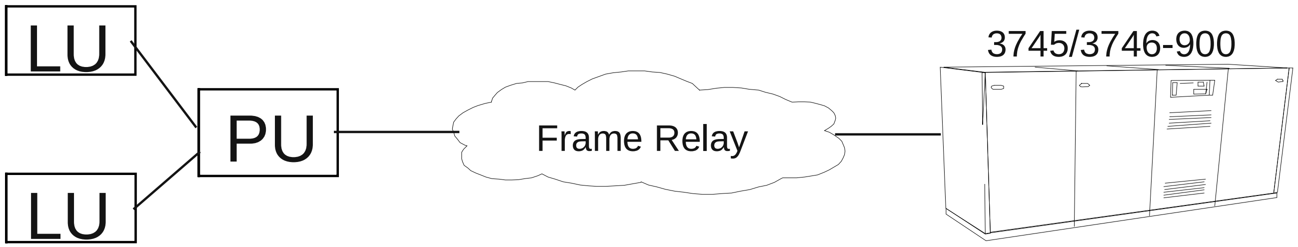
Network management nightmare

DSPU

This ....



"Looks" like this ...



Sysdef intensive

Alters the logical topology of the network as seen by network management applications such as NetView

Frame Relay BAN

If Layer 2 addressing in the Frame Relay header is needed for LAN devices, then add it !

Choices ...

- Invent a new header
- Use a previously defined header that has the appropriate information

Frame Relay BAN uses the RFC 1490 Bridged 802.5 frame format

- ➡ I said bridged frame format, not bridged frame.

- Fulfills the need for layer 2 addressing
- Down side is larger headers on each frame..

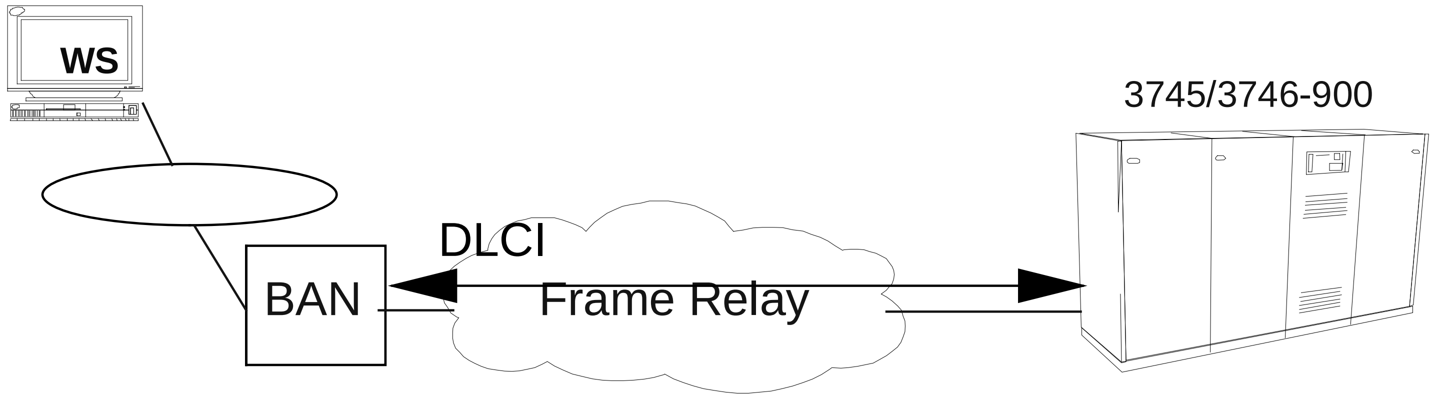
RFC 1490 SNA Bridged Frame Format

Q.922 Address	
Control 0x03	pad 0x00
NLPID 0x80 (SNAP)	OUI 0x00
OUI 0x80-C2 (Bridged)	
PID 0x00-09 (No FCS)	
pad 0x00	Frame Control
Destination MAC (6 bytes)	
Source MAC (6 bytes)	
RIF (4-18 bytes)	
Destination SAP	Source SAP
802.2 Control (1-2 bytes)	
Remainder of LPDU	
Frame Relay FCS	

Bridged Frame Format Advantages

- ✓ Eliminates the sysdef of LAN stations since the station address is passed thru to the 3745/3746-900.
- ✓ No architectural limit to the number of stations using a Frame Relay PVC (DLCI).
- ✓ LAN stations can be added w/o additional configuration changes for the access device or the Frame Relay carrier.
- ✓ Alerts sent to NetView by the 3745/3746-900 for BAN stations contain both PVC and MAC address information for easy station identification.
- ✓ Can be implemented with low overhead in the BAN access device.

BAN DLCI MAC Address

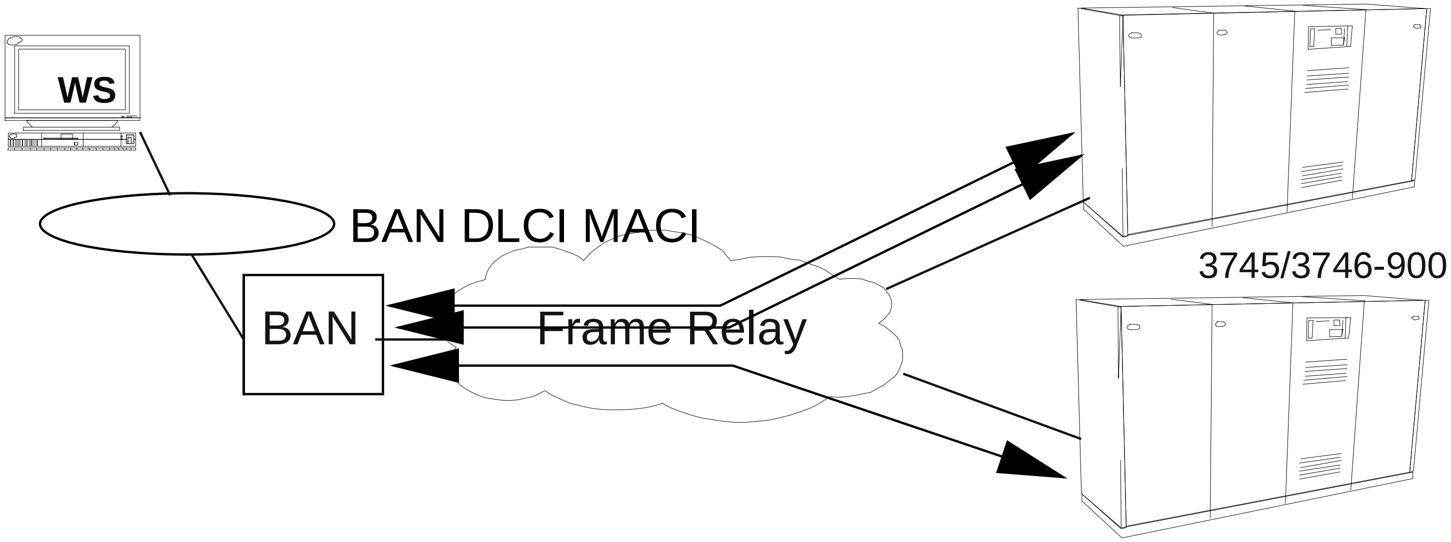


Each FR BAN PVC has a MAC address assigned

- Known as the BAN DLCI MAC Address

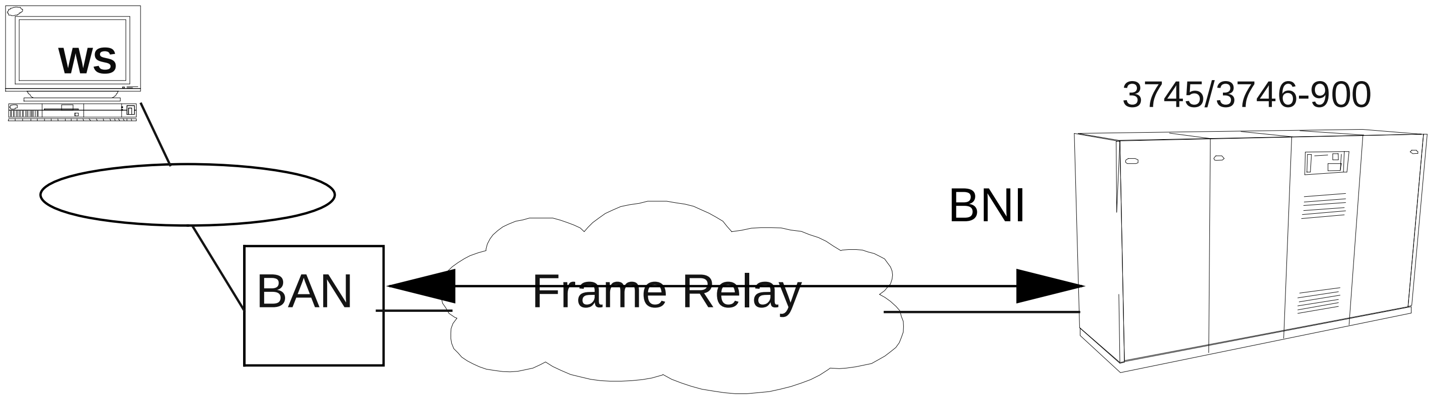
- LAN end stations initiating sessions to the 3745/3746-900 are configured with this address as their destination MAC address
- The BAN DLCI MAC address appears as the source MAC address in frames sent by the BAN device to LAN stations.

Duplicate BAN DLCI MAC Addresses



- ✓ Duplicate BAN DLCI MAC Addresses within the same BAN device and different BAN devices are allowed.
- ✓ Allows parallel paths for load balancing
- ✓ Allows duplicate paths for redundancy
- ✓ Provides function similar to 3745 duplicate TIC support

Boundary Node Identifier



All frames passed to a 3745/3746-900 by a BAN device will have their destination MAC set to the address known as the Boundary Node Identifier (BNI).

The BNI allows the 3745/3746-900 to identify BAN frames w/o being configured with the BAN DLCI MAC.

- This protects the 3745/3746-900 from FN BNN implementations that bridge all traffic.

- Frames from the 3745/3746-900 to the BAN device will have their source MAC set to the BNI.

Boundary Node Identifier Default

The 3745/3746-900, 2210, and 6611 all default the Boundary Node Identifier to 4FFF00000000

The BNI can be changed in the configuration of the BAN access device and in the NCP definition.

- Line statement for the Frame Relay adapter (LOCADD parameter).

- Changing the BNI is required only in the event that a network contains a node with a MAC address of 4FFF00000000.
- The BNI and BAN DLCI MAC can be the same.

F/R BAN is NOT Bridging

Frame Relay BAN is NOT the same as bridging over Frame Relay.

The ONLY LAN frames sent on a BAN PVC to the 3745/3746-900 are those that have a destination MAC address equal to the BAN DLCI MAC Address for that PVC.

- This means that the PVC will not have to carry any broadcast traffic that is not meant for the 3745/3746-900.

- The Boundary Node Identifier must appear as the destination address in frames sent to the 3745/3746-900, and will appear as the source address in frames originating from the 3745/3746-900.
  - If the BNI and BAN DLCI MAC are not the same, the BAN access device must change them.