Accredited Standards Committee **X3S3.3/92-231**
X3, INFORMATION PROCESSING SYSTEMS **1 June, 1992**

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To: X3S3.3

From: D. Marlow (NSWC)

Re: Tutorial Viewgraphs on identifying group addresses and multicast PDUs.

NSWC has prepared this contribution in support of the Group Network Address project JTC1.06.32.01.05 and the NWI proposal sent to SC6 (X3S3.3/92-145). The technical contributions that the U.S. supplied proposed marking the group Network addresses and marking the multicast PDUs. The presentation material provided here is intended to support discussion on these topics at the SC6 July meeting in San Diego.

U.S. discussion on this input is planned for the ANSI X3S3.3 committee's June 1992 meeting in Raleigh, N.C.

OSI Multicast Development:

Identifying Multicast PDUs and Group Addresses

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Identifying Multicast PDUs and Group Addresses

- U.S. discussions on the addition of multicast to the OSI Network layer standards considered whether group Network addresses should be dedicated for multicast use and/or whether multicast connectionless NPDUs should be marked
  - Initial consensus was reached that both were needed.
    - U.S. is still considering these issues and is interested in the views of other national bodies
  - U.S. contributions have incorporated these into its initial contributions
- In considering this topic concerns for such identification fell into three categories:
  - Could be handled by either marking the address or the PDU
  - Needs to be handled by marking the address
  - Needs to be handled by marking the PDU

Capabilities Provided Either by Marking the Address or the PDU

- In the connectionless Network environment, multicast PDUs must be recognized and distinguished from unicast PDUs
  - **Forwarding is different!**
  - Must be no impact to non-multicast transfers
  - Permit different algorithms for the IS-IS routeing
    - For example, behavior may need to be different for what an IS does when receiving a PDU with an unknown destination address
  - Provide a means for mapping a group NSAP address to a group SNPA (which will need to be different from the unicast case)
- Permit different error reporting policies for multicast and unicast
- Permit congestion control algorithms to make use of the fact that a PDU is multicast

Capabilities provided by marking the CLNP PDU

- It is expected that cut-through switches will need to make decisions based on a PDU being multicast prior to receiving the Network address
- For Connectionless-mode routeing, when IS without the multicast extensions receives a PDU with an unknown destination address it **may** send the PDU on to a Level 1 IS with the multicast extensions or one without these extensions. Best if an IS without these extensions just ignores these PDUs. Non-deterministic behavior may lead to:
  - Blacking-out segments of multicast PDUs
  - Duplicate deliveries of multicast PDUs

Capabilities provided by marking the Network address

- The most straight forward means to support checks that a multicast address is never placed in the source address fields
  - Need to prevent “broadcast storms”
- Allows the development of level 1 routers, fully multicast capable, which make forwarding decisions solely based on the address
  - Easily preventing default level 1 to level 2 forwarding behavior
  - multicast routeing algorithms will be different from the unicast algorithms
  - technique is used today with non-multicast routers
- Supports managing forwarding tables via addresses examination
  - allows consistency checks when a Network address implies multiple transmissions

Identifying Multicast PDUs and Group Addresses Conclusion

- Identify both the CLNP PDU and Group Address since both are needed

Approach for Modifying the Network Address Addendum to Support Multicast Transfer

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Modifications ISO 8348 Addendum 2

- Given a decision to mark a Network layer address as a group address
  - An approach needs to be developed to carry this out
  - The U.S. in its discussions came up with a number of driving concerns:
- No modifications to the currently defined addresses or addressing structure
  - An alternative method to partition the AFI space is of interest
  - Given that many domains are defining addresses at the maximum length already, no capability exists to just append a new field onto existing addresses
- Do not establish new addressing authorities
  - Such addresses need to be linked to the present addressing authorities
- Such an address must be able to be identified as a group address even if it is not recognized (i.e. Easily Distinguished by simple examination)
  - Requires domain independence and thus the only option is in the IDP
    - Only facility provided is via defining new AFIs

Define New AFIs linked to the Current AFIs

- Initial Approach:
  - Define New AFIs linked to the current AFIs with all the same properties (except for use only as group addresses)
- Issue remained as to which AFIs would have linked group AFIs
  - One approach considered was to provide only one (or the absolute minimum)
    - This would require users who needed to use multicast to perhaps utilize different addressing authorities for unicast and group addresses.
    - Appears limiting multicast for some users
  - Another approach is to provide a linked group AFI for every current AFI
    - Requires 24 new AFIs
  - Initial approach is to propose a linked group AFI for every current AFI
    - Leave decision with the individual addressing authorities
    - In the development of this standard it is expected that some group AFIs will be dropped due to lack of need

Initial View on Group Addresses

Directory Services

Upper Layers	Selectors
Transport Layer	Selectors
Network Layer	Group Network Entity Titles, Group NSAP Addresses (with selectors)
Data Link Layer	SNPA Addresses, Group SNPA Addresses

Extensions to the Addressing Addendum (ISO 8348 Addendum 2)

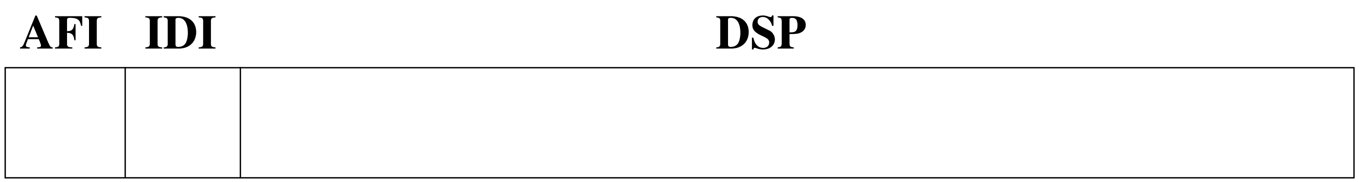
- Provide a parallel group address family for all existing ISO Addressing Families
  - Group Addresses will only be provided through these new group address families
  - Non-group addresses will not be allocated from non-group address families
- Group addresses are restricted for use **<u>ONLY</u>** valid for "destinations"
  - Provides "easily distinguishable" group addresses
    - Supports Network layer protocol checks
- Provides for:
  - Group NSAP addresses
  - Network Entity Group Titles
- All existing rules of NSAP address prefix matching are to hold

Proposed AFI Values

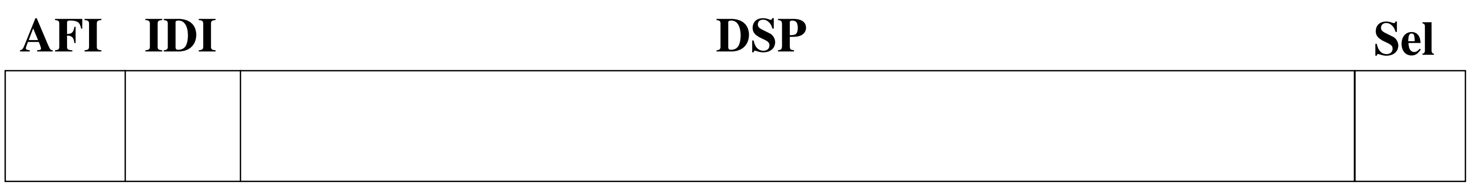
IDI format \ DSP syntax	Decimal	Binary	Character (ISO 646)	National Character
X.121	36, 52	37, 53		
X.121 Group	a[1], q[1]	b[1], r[1]		
ISO DCC	38	39		
ISO DCC Group	c[2]	d[2]		
F.69	40, 54	41, 55		
F.69 Group	e[1], s[1]	f[1], t[1]		
E.163	42, 56	43, 57		
E.163 Group	g[1], u[1]	h[1], v[1]		
E.164	44, 58	45, 59		
E.164 Group	i[1], w[1]	j[1], x[1]		
ISO 6523-ICD	46	47		
ISO 6523-ICD Group	k[2]	l[2]		
Local	48	49	50	51
Local Group	m[3]	n[3]	o[3]	p[3]

[1]- ***To be allocated from the AFIs reserved for CCITT or joint ISO and CCITT agreement.***
[2]- ***To be allocated from the AFIs reserved for ISO or joint ISO and CCITT agreement.***
[3]- ***To be allocated from the AFIs reserved for joint ISO and CCITT agreement.***

Network Layer Multicast Addresses



Network Entity Group Title



Group NSAP Address