Accredited Standards Committee
X3, INFORMATION PROCESSING SYSTEMS

X3S3.3/92-80
2 February, 1992

David T. Marlow
Naval Surface Warfare Center
Technology Branch, Code N35
Dahlgren, VA. 22448
703.663.1571
dmarlow@relay.nswc.navy.mil

To: X3S3.3

From: D. Marlow (NSWC)

Re: Approach for providing OSI Connectionless-mode Multicast support to the ES-IS routeing exchange protocol

NSWC has prepared this working draft of an Amendment to the "End system to Intermediate system routeing exchange protocol for use in conjunction with the Protocol for providing the connectionless-mode network service (ISO 8473)", ISO 9542. U. S. discussion on this contribution was held at the ANSI X3S3.3 January meeting in Tucson, AZ.

This is a proposed contribution to the interim SC6 meeting on "enhanced transport mechanism guidelines" in Paris on February 10-13, 1992.

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2 February, 1992

A. Lyman Chapin
BBN Communications 20/5b
150 Cambridge Park Drive
Cambridge, MA 02140
617. 873.3133
lyman@bbn.com

To: X3S3

From: X3S3.3

Re: Proposed changes to the ES-IS routeing exchange protocol to provide support for connectionless-mode multicast

Task group X3S3.3 has prepared this working draft of an Amendment to the end system - intermediate system routeing exchange protocol (ISO 9542) providing support for connectionless-mode multicast transmission for discussion at the interim SC6 meeting on “enhanced transport mechanism guidelines” in Paris on February 10-13, 1992.

1992-02-02

ISO/IEC JTC1/SC6
TELECOMMUNICATIONS AND INFORMATION EXCHANGE BETWEEN SYSTEMS
Secretariat: U.S.A. (ANSI)

Title: Proposed changes to the end system - intermediate system routeing exchange protocol to support connectionless multicast

Source: USA

Project(s): [new]

Status: For discussion at the interim meeting of SC6 on "enhanced transport mechanism guidelines" in Paris on February 10-13, 1992.

This contribution presents an approach that is currently being evaluated within the US for high performance networking. After further review, the protocol modifications presented in this document may undergo significant changes.

Requested Action:

Attachments:

Distribution:

Preface

This contribution provides detailed changes to ISO 9542 to permit multicast transfer as an option. Additional functionality in ISO 9542 is required for Intermediate Systems to find which multicast PDUs are needed on which subnetworks. The optional functionality is enabled by End Systems passing End System Group Hello (ESGH) PDUs stating their intentions to receive specific multicast PDUs (identified by specific group NSAP addresses contained within the ESGH PDU).

In developing the detailed changes to ISO 9542 a number of differences were noted in the operation of ES-IS operations to support multicast transfer and that which are provided now. The following differences were noted:

a) The only dynamic activity for multicast transfer is that performed by the ESs which periodically source ESGH PDUs stating their intentions to receive specific multicast PDUs. There are no actions defined for ISs to pass control information to ESs or to modify the activities of the ESs in support of multicast transfer. The means for ISs to exchange information among themselves in support of multicast transfer is outside of the scope of the referenced standard.

b) Query Configuration (and thus the corresponding Configuration Response function) cannot be requested by ESs. The operation, if performed, would result in an ES receiving the SNPA address of another ES and not the group SNPA address it is seeking.

c) An ES will report group NSAP addresses only on subnetworks for which it wants to receive such multicast PDUs and not necessarily all subnetworks to which it has SNPAs. Reports on multiple SNPAs is a request for duplicate PDUs.

The issues still being considered in utilizing ISO 9542 for multicast transfer are:

a) Presently there is no dynamic means for an end system to determine the group SNPA address corresponding to a group NSAP address. An end system is permitted to use means outside of this standard (e.g. static configuration or embedding the needed address information within the group NSAP address) to determine the group SNPA address to associate with a group NSAP; however, if the group SNPA is not otherwise known an ES is permitted to use the defined “All Connectionless Multicast Network Entities” SNPA address.

b) A means for a multicast capable IS to suggest a value for ES’s ESGH configuration timer.

c) A means of randomizing the ESGH reports by ESs (all having the same value for their ESGH configuration timer) is needed to avoid the synchronization of such reports on a subnet.

This Amendment is one component of a number of standardization actions on-going to support an OSI connectionless-mode multicast capability. Additional proposals are on-going to provide additions to the connectionless-mode Network service definition and addressing addendums, the connectionless-mode Transport protocol and the connectionless-mode Network layer protocol.

Date: 1992-02-02

Information processing systems - Telecommunications and information exchange between systems - End system to Intermediate system routeing exchange protocol for use in conjunction with the Protocol for providing the connectionless-mode network service (ISO 8473)

Amendment X: Addition of connectionless-mode multicast capability

0 Introduction

This Amendment to ISO 9542 adds optional functionality to support multicast transfer. The entire ES - IS protocol is contained in ISO 9542.

ISO 9542 provides the capability to support the routeing of non-multicast PDUs; however, it does not directly support the exchange of multicast PDUs. The capabilities required to support End Systems needing to source or sink multicast PDU includes the means for Intermediate Systems to find which multicast PDUs are needed on which subnetworks.

This Amendment defines the optional additional functionality to the ES - IS Routeing Protocol (ISO 9542) which supports the transfer of multicast PDUs. It is an explicit goal of this Amendment that ESs and ISs some of which will have multicast capabilities and some without will be able to fully function on the same subnetworks. This amendment does not change any aspect of a currently defined (i.e. non-multicast) ISO 9542 implementation, it adds new optional functionality not modifying current functionality.

1 Scope and Field of Application

This Amendment makes no changes to clause 1 of ISO 9542.

2 References

This Amendment makes no changes to clause 2 of ISO 9542.

3 Definitions

This Amendment makes no changes to clause 3 of ISO 9542.

4 Symbols and Abbreviations

This Amendment makes no changes to clause 4 of ISO 9542.

5 Overview of the protocol

Add two sentences to the end of the second paragraph of 5.1 (paragraph beginning with "Configuration information permits..."):

This information also allows ISs with the optional capability to support multicast transfer to dynamically discover what multicast PDUs are needed on a particular subnetwork by the ESs that are attached to that subnetwork.

Add a third and fourth bullet to 5.3.1:

* All Connectionless Multicast Network entities

*group SNPA address corresponding to a group NSAP

Change the phrase in the second sentence in the (c) paragraph of 5.4.2.1 "particular NSAP" to:

particular non-group NSAP

Add a paragraph d) and a Note to 5.4.2.1:

d) Intermediate Systems with the optional OSI multicast capabilities are informed of the group NSAP addresses which End Systems on this subnetwork need to receive.

Editor's Note: Intermediate Systems with the optional OSI multicast capabilities do receive information identifying which particular ESs on the broadcast network want PDUs with particular group NSAP addresses as their destination address; however, the critical information is which multicast PDUs are needed not which ESs need them.

6 Protocol Functions

Add section 6.2.3 and an Editor's Note:

6.2.3 Report Group Configurations by End Systems

An End System which needs to receive or continue to receive any multicast PDUs (i.e. NPDUs with group NSAP addresses as their destination address), constructs and transmits ESGH PDUs to inform Intermediate Systems with the optional multicast capabilities of the multicast PDUs it needs to receive. This may be done by constructing ESGH PDUs for each group NSAP address. Alternatively, ESGH PDUs may be constructed which convey information about more than one NSAP address at a time, up to the limits imposed by the permitted SNSDU size and the maximum header size of the ESGH PDU. Each ESGH PDU is transmitted by issuing an SN-UNITDATA.Request with the following parameters:

SN_Userdata (SNSDU) <- ESGH PDU

SN_Destination _Address <- multi-destination address that indicates "All Connectionless Multicast Network Entities"

Where an End System supports more than one SNPA, the information about each group NSAP address desired for receiving on a particular SNPA serving the End System shall be transmitted via that SNPA. It is permissible for an End System to report group NSAPs on multiple SNPAs; however, duplicate multicast PDUs should be anticipated.

Timer considerations are unspecified; however it is permissible to set the ESGH Configuration Timer to same value as the ES's Configuration timer.

Editor's Note: There is no means presently developed for the IS's to suggest an ESGH Configuration timer value. This is presently under study.

Change in Section 6.3 the two occurrences of "ESH or ISH" to:

ESH, ESGH, or ISH

Add a second Note after the first Note of 6.3:

Note: If an ES with the optional capabilities to support multicast transfer so desires, it may decide to process ESGH PDUs multicast by other End Systems. There is potentially some reduction in network traffic by doing this. An ES requesting to receive multicast PDUs is permitted to reset its ESGH Configuration Timer corresponding to one group NSAP address on one SNPA upon receiving an ESGH PDU from another ES under the following circumstances:

a) The group NSAP address, SNPA pairing of the ESGH PDU received matches that of the ES processing the PDU.

b) The Holding Timer parameter value in the PDU received is equal to or greater than the Holding Timer value being used by the ES processing this PDU.

Add a second paragraph in Section 6.3.1:

On receipt of an ESGH PDU an IS with the optional multicast capabilities extracts the configuration information and stores the {group NSAP address, SNPA} in its local multicast routeing information base replacing any other information for the same entry.

Add to paragraph (c) of 6.5 prior to the word "NSAP":

non-group

Add a Note under point (c) of 6.5:

Note: The Query Configuration function cannot be performed to find the corresponding SNPA address of a group NSAP address since the addressing information needed is the corresponding group SNPA address and not the SNPA address of a particular End System responding. On a large broadcast subnetwork, many different Configuration Responses could result each incorporating a different End System Address. While it is possible to design a Query Configuration for use with multicast, this function does not appear to be required given the use of the "All Connectionless Multicast Network Entities" for supplying a SNPA address when the group SNPA address is not known.

Add a paragraph to the end of 6.5:

For multicast transfer, an End System which does not know the group SNPA address to use as a destination address parameter for a multicast PDU it needs to originate shall use the "All Connectionless Multicast Network Entities" address.

7 Structure and Encoding of PDUs

Add a new entry to Table 2, determine actual binary values at a later time:

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ESGH PDU a b c d e
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Throughout section 7.3, including the subparagraph and figures and section titles, replace:

"ESH" with "ESH and ESGH"; {detailed changes may require the word "and" to be replaced by a "," or the word "or"}

Add section 7.8:

7.8 End System Group Hello (ESGH) PDU

The ESGH PDU has the format shown in figure 9.

Change the title of Figure 9 to:

ESH and ESGH PDU Format

8 Conformance

Changes to the Conformance (section 8) are needed. Changes to the Static Conformance Requirements (8.1, 8.1.1, 8.1.2) and the Protocol Implementation Conformance Statement will be supplied at a later time. All capabilities to support multicast transfer are to be optional.