Introduction

The "End System to Intermediate System routeing Exchange Protocol for Use with ISO 8473" (ISO 9542) permits End Systems (ESs) and Intermediate Systems (ISs) to exchange configuration and routeing information. This amendment is an enhancement to the protocol called address administration, which is concerned with design objective #1 of the ES-IS protocol (clause 0): "minimize the amount of a priori state information needed by ESs before they can begin to communicate with other ESs". The enhancement consists of a mechanism by which many types of ESs can obtain sufficient information to derive their own Network Addresses by means of an ISO 9542 protocol exchange. Such a mechanism would eliminate the need for those types of ESs to have any a priori state information about their own Network Layer addressing values.

Implementation of the enhancement is optional. In its absence, ESs would need to be pre-configured with knowledge of their own Network Addresses. If an IS implements the enhancement, some or all of the ESs that use ISO 9542 to exchange routeing information with that IS may make use of the address administration mechanism; those that do not are unaffected.

Specification of Address Administration

Four new functions are required for address administration: *request address* by End Systems; *assign address* by Intermediate Systems; *record address* by End Systems; and *flush address* by End Systems. Two new PDUs are also required: the *request address* (RA) PDU and the *assign address* (AA) PDU.

Adding address administration to ISO 9542 as an optional feature requires modifications to the following clauses:

0 Introduction

Add the following as a fifth entry in the first list of Objectives:

"e) how does an End System, which has not been pre-configured with its own Network Address, request a temporary assignment of a Network Entity Title (NET) and thus, derive the necessary NSAP address(es) from an IS located on a common subnetwork?"

4.2 Protocol Data Units

Add the following Abbreviations:

"AA PDU Assign Address Protocol Data Unit"
"RA PDU Request Address Protocol Data Unit"

4.4 Parameters

Add the following parameters:

"AHT Address Holding Timer"
"RART Request Address Retry Timer"

5.1 Information Provided by the Protocol

Change the third (single-sentence) paragraph to read as follows:

"Configuration Information also permits End Systems to obtain a temporary Network Entity Title (NET) without manual intervention, and to obtain information about each other in the absence of an available Intermediate System.

6.4 Flush Old Configuration Function

Insert the following clauses immediately before this clause and renumber the remaining clauses appropriately:

"6.4 Request Address Function in the ES

An End System might not have been pre-configured with knowledge of its own Network Address. Such a system initiates a request for a Network Entity Title (NET) by constructing a single RA PDU and issuing one (or more) SN-UNITDATA Request with the following parameters:

SN_Userdata (SNSDU)	←	RA PDU
SN_Destination Address	←	Multi-destination address that indicates "All Intermediate System Network Entities"

Where an End System has more than one SNPA, it may optionally send one (or more) such RA PDU for each SNPA.

An End System may optionally implement a RART (Request Address Retry Timer) to place a bound on the waiting period between the issue of the Request Address PDU and the arrival of an Assign Address PDU. The value of this timer is a local matter. If this timer expires the ES has the option of resending the RA PDU or utilizing the procedures outlined in clause 6.6.

6.5 Assign Address Function in the IS

An Intermediate System maintaining the appropriate subnetwork configuration information acts on the arrival of an RA PDU by determining a NET for assignment to the End System that originated the RA PDU. Intermediate Systems that do not support the address administration option discard the RA PDUs.

[Note: The way in which an Intermediate System determines NETs according to this function is not specified. The IS may use any algorithm that ensures unambiguous NET assignment. That is, no NET may be reported to more than one SNPA. The IS may report the same NET if requested from the same SNPA Address on separate occasions. For example, the IS may construct a NET based on the RA PDU originator's source SNPA and local information, or maintain a manually administered database from which NETs are selected according to some locally specified criterion. If more than one IS on a given subnetwork supports the address administration option, they must coordinate their NET reporting algorithms to ensure that all NETs are unambiguous. Such procedures would be out of the scope of this standard. For illustrative purposes, however, a static algorithm for address distribution could be one in which each IS participating in address administration would be assigned a range of addresses to distribute.]

The Intermediate System constructs an assign address (AA) PDU, placing the newly determined NET in the appropriate field, and including an address holding time (AHT) which represents the amount of time that the End System may continue to use it. The Value "zero" is excluded as an allowable value for the AHT Parameter.

The NET has the structure and semantics of an NSAP address in which the last octet (binary DSP syntax) is "zero" or the last two digits (decimal DSP syntax) are zero (See clause 6.6). [The AHT should be much larger than the configuration information holding timer; see clause 6.1.2.] The IS issues one SN-UNITDATA Request with the AA PDU as the SNSDU. The SN-SOURCE-ADDRESS parameter from the previously received RA PDU is used as the SN-DESTINATION-ADDRESS parameter of the AA PDU.

Using this function the NET sent to the ES in the AA PDU shall have its last octet (binary DSP syntax) set to "zero" (or the last two digits if decimal DSP syntax) value and the ES may derive NSAP address(es) by changing **only** that last octet or two digits. (Also see new clause 6.6)
The IS shall not record the configuration for this End System as part of the "assign Address" function, since the End System is not required to use the assigned NET as an NSAP address. The End System configuration is recorded only via the "record configuration" function described in clause 6.3.

The configuration information provided by subsequent ESH PDUs will reflect usage of the NET contained in the AA PDU as either an NSAP Address with no modifications or NSAPS Addresses derived from the NET via adding code points in the last octet or two digits of the address This also allows the IS to determine if the End System, which may have received AA PDUs from other ISs, had indeed chosen the NET that it issued. If the IS determines that its NET had not been used by the ES, then that NET will be free to be issued on subsequent Assign Address PDUs.

6.6 Record Address Function in the ES

The record address function extracts the assigned NET from an AA PDU it receives. If it receives more than one AA PDU, in the case of multiple Intermediate Systems on the same subnetwork participating in address administration, it chooses one by a method that is a local matter. It starts an address holding timer (see clause 6.7) using the address holding time contained in the AA PDU. The assigned NET may be used as an NSAP address. If the End system employs more than one NSAP address for its operation, it may derive additional NSAP addresses from the assigned NET by using the code points provided by the "zeros" in the last octet or two digits (See new clause 6.5). [Note: The method of derivation is not specified in this standard.]

If there is no response to the Request Address PDU, ie. the Request Address Retry Timer (RART) expires, or no IS exists, the ES has the option of assigning a "local" address by using either:

AFI = 49 (binary DSP format) and the DSP = SNPA.

AFI = 48 (decimal DSP format) and the DSP = SNPA

Note that this "local" NSAP has significance only within the subnetwork that the ES resides. (See new clause 6.5)

6.7 Flush Address Function in the ES

If an End System acquires a NET through the operation of the "request address" function, it shall implement an address holding timer associated with this NET. The initial setting of this timer shall be obtained from the AHT field of the Assign Address PDU. If the timer expires, the End System shall discard the NET and all derived NSAP addresses. It may perform the "request address" function to obtain a new NET.

[Note: This ensures that NETs that have been erroneously or improperly assigned (as, for example, by a malfunctioning Intermediate System) will eventually be purged. To provide continuous service, the ES may invoke the "request address" function before expiration of the AHT. When this function is used to

obtain a "new" NET, it is entirely possible for the "new" one to be the same as the "old", depending on how the Intermediate Systems have implemented their NET administrative algorithms.]"

There is an additional cause to discard the NET (and derived NSAP addresses). This is if the ES changes its SNPA through which the NET was obtained.

7.2.5 Type Code

Add the following code points to Table 2:

RA PDU - bits 00001
AA PDU - bits 00011

7.2.6 Holding Time

Change the first paragraph to read as follows:

"The Holding Time field specifies the maximum time for the receiving Network Entity to retain the configuration/routeing/address administration information contained in this PDU."

7.3.1 General

In the first paragraph,third sentence, add the following term after the term ending "... Intermediate System Network Entity Title (NET);":

"The AA PDU carries an End System NET;"

7.3.5 Destination Address Parameter for RD PDU

Insert the following clause immediately before this clause (7.3.5), renumbering it and the following clauses appropriately:

"7.3.5 Network Entity Title (NET) Parameter for an AA PDU

The NET parameter is the NET that is being provided to the End System in response to the Request Address PDU. It is encoded in the PDU as shown in Figure 4."

7.3.6 Destination Address Parameter for RD PDU

Change the title of Figure 4 to read as follows:

ISH, AA, or RD PDU — Network Entity Title Parameter

7.4.2 Security

Change the first sentence to read as follows:

"The Security option may appear in the ESH, ISH, RA, AA, or RD PDU"

Change the second sentence, second paragraph,to read as follows:

"When carried in the ESH, RA, AA, or ISH PDU, the Security parameter conveys security information about the transmitting system."

7.4.4 Priority

Change the first sentence to read as follows:

"The Priority Option may appear in the ESH, ISH, RA, AA, or RD PDU."

Change the second sentence, second paragraph to read as follows:

"When carried in the ESH, RA, AA, or ISH PDU, the Priority parameter conveys the priority of the transmitting system."

7.8 Request Address (RA) PDU

Add this as a new clause:

7.8 Request Address (RA) PDU

The RA PDU has the following format:

				Octet
Network Layer Protocol Identifier				1
Length Indicator				2
Version/Protocol ID Extension				3
Reserved (must be zero)				4
0	0	0	Type	5
Reserved (must be zero)				6,7
Checksum				8,9
Options				10 m-1

Figure 13: RA PDU Format

7.9 Assign Address (AA) PDU

Add this as a new clause:

7.9 Assign Address (AA) PDU

The AA PDU has the following format:

				Octet
Network Layer Protocol Identifier				1
Length Indicator				2
Version/Protocol ID Extension				3
Reserved (must be zero)				4
0	0	0	Type	5
Address Holding Time (AHT)				6,7
Checksum				8,9
NET Length Indicator (NETL)				10
NET				11 m-1
Options				m n-1

Figure 14: AA PDU Format

8.1 Static Conformance Requirements

Add the following entries to Table 3:

Request Address	new 6.4	0	0	0	—	—
Assign Address	new 6.5	—	—	—	0	0
Record Address	new 6.6	0	0	0	—	—
Flush Address	new 6.7	0	0	0	—	—

A.2.2 Option-status and Predicate Symbols

Add the following term at the end of this clause:

"AA: the status following this symbol applies only when the PICS states that Address Administration is supported."

A.4 PICS Proformas

Add the following entries to the "End System" section of the PICS Proforma:

a) Subgroup 1 - Protocol Function

AA	Is Address Administration Supported?		O	Yes No

b) Subgroup 2 - Functions Supported

RqAd	Request Address	New 6.4	AA:M	Yes No:X___
RcAd	Record Address	New 6.6	AA:M	Yes No:X___
FlAd	Flush Address	New 6.7	AA:M	Yes No:X___

c) Subgroup 3 - PDUs supported

RA-s	<s> Request Address	New 6.4, 7.8	AA:M	Yes No:X___
AA-r	<r> Assign Address	New 6.5, 7.9	AA:M	Yes No:X___

d) Subgroup 4 - PDU fields supported

NETA-r	<r> NET-AA	New 7.3.5	AA:M	Yes No:X___

e) Subgroup 5 - Parameter Ranges

RARTv	What range of values can be set for the Request Address Retry Timer?	New 6.4	AA:M	From: seconds To: seconds by increments of: (other - specify): with a tolerance of:

Add the following entries to the "Intermediate System" section of the PICS Proforma:

a) Subgroup 1 - Protocol Function

AA	Is Address Administration Supported?		O	Yes No

b) Subgroup 2 - Functions supported

AsAd	Assign Address	New 6.5	AA:M	Yes No:X___

c) Subgroup 3 - PDUs supported

RA-r	<r> Request Address	New 6.4, 7.8	AA:M	Yes No:X___
AA-s	<s> Assign Address	New 6.5, 7.9	AA:M	Yes No:X___

d) Subgroup 4 - PDU fields supported

NETAA-s	<s> NET	New 7.3.5	AA:M	Yes No:X___

Annex C State Tables

Add the following terms to Table 4 (State Tables):

AHT	Address Holding Timer expiry
RART	Request Address Retry Timer expiry
AA	Assign Address PDU received
RqA	Address required
RA	Request Address PDU received

Add the following entries to Table 5 (State Tables - Predicates):

Pa	System supports Address Administration
P6	Address Holding Timer has expired
P7	Received RA PDU
P8	Request Address Retry Timer has expired

Add the following entries to Table 6 (State Tables - Specific Actions):

AHT-reset	Stop and restart Address Holding Timer
RART-reset	Stop and restart Request Address Retry Timer
FlushA	Flush NET(s) and all derived NSAP Addresses
AA:SN-SA	Send Assign Address PDU with SN-DA=received SN-SA
RecordA	Record new NET and derived NSAPs
RA:IS	Send RA PDU with SN-DA=ALL_ISs

Add the following entries to Table 7 (End System State Table):

RqA	Pa	RA:IS;RART-reset	New 6.4, 6.7	Ready
	Pa∧P8	RA:IS;RART-reset	New 6.4, 6.7	Ready
AHT	Pa∧P6	RA:IS	New 6.4	Ready
AA	Pa	FlushA;RecordA;AHT-reset	New 6.4, 6.7	Ready

Add the following entry to Table 8 (Intermediate System State Table):

RA	Pa∧P7	AA:SN-SA	New 6.5	Ready