1. Introduction

The "End System Routeing Information Exchange Protocol for use in conjunction with ISO 8878" (ISO 10030) permits End systems (ESs) and SNAREs to exchange configuration and routeing information. This addendum is an enhancement to the protocol called *address administration*, which is concerned with design objective a) of the Introduction: "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 their own Network Entity Titles (NETs) by means of an ISO 10030 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 Entity Titles. If a SNARE implements the enhancement, some or all of the ESs that use ISO 10030 to exchange routeing information with that IS may make use of the address administration mechanism; those that do not are unaffected.

2. Motivation for Address Administration

To the greatest possible extent, it is desirable to uncrate a new computer system, plug it in, and start using it without having to configure it manually. This is true of small non-shared ESs, such as personal computers and workstations. In many LAN-oriented networking configurations, most (if not all) of the attached ESs fall into this category. These ESs typically do not appear in a manually administered directory, since they are not sought by other systems (they are clients, not servers). For this reason, the choice of their Network Entity Title is not as important as it would be for a server system that must establish its identity on a relatively permanent basis so as to be accessible to client systems. It is still essential, however, for these systems to have Network Entity Titles that are globally unique.

Without the address administration feature, a network administrator must keep track of a large and varying population of systems and their Network Entity Titles to ensure uniqueness. This is typically an error-prone process; a chronic source of delays and disruptions in maintaining networks.

With address administration, on the other hand, a network administrator must keep track only of *shared* systems (servers). These systems appear in directories, because other systems must be able to locate them, and are typically much less numerous than non-shared systems. Requiring manual address administration for only these systems, then, considerably reduces the maintenance burden for network administrators.

3. Specification of Address Administration

Four new functions are required for address administration: *request address* by End Systems; *assign address* by SNAREs; *record address* by End Systems; and *flush address* by End Systems.

Adding address administration to ISO 10030 as an optional feature requires the following modifications to the text:

3.1 Add the following as a fourth entry in the first list of objectives in the Introduction:

> "d) how does a simple End System, which has not been pre-configured with its own Network Entity Title, request the temporary assignment of a Network entity Title from a SNARE located on a common subnetwork.

3.2 Add the following text as a new point c) in clause 5 under "The functions of the Configuration Information Subset":

"c) to enable ESs to obtain their own Network Entity Titles without manual intervention."

3.3 Add the following paragraph to clause 5.2 prior to the sentence beginning "The ES may also ...":

"Optionally, following acceptance of the call by the SNARE, a non-configured End System may request a Network Entity Title for itself. Once it obtains this information it utilizes the Network Entity Title as an NSAP address or, if desired, derive additional NSAP addresses for subsequent interactions with other End Systems. However, it is not necessary or even permitted for an End System to use a Network Entity Title obtained in this manner indefinitely."

3.4 Add the following new subclause following 8.1.3:

"8.1.4 Address Holding Time"

This parameter represents the amount of time that the End System may continue to use an address that has been assigned to it by the SNARE.

3.5 Add the word "or" at the end of subclause b) of 8.2.1.

3.6 Add the following text as a new point c) in clause 8.2.1.

"c) it needs to obtain an NET when initially connecting to the subnetwork or upon expiration of the Address Holding Time value,"

3.7 Add the following text as a new point c) in clause 8.2.2.

"c) if the ES needed to obtain an NET, the time at which a further attempt is made (if any) is a local matter."

3.8 Change the last paragraph of clause 8.2.3 to read as follows:

"The data transfer procedure consists of 3 parts -- address assignment, configuration notification and configuration collection. When the address assignment procedure is applicable, it shall be carried out immediately following connection establishment. When the configuration notification procedure is applicable, it shall be carried out after completion of the address assignment procedure (or immediately if the address assignment procedure is not applicable). When the configuration collection procedure is applicable, it shall be carried out after completion of the address assignment and/or configuration notification procedures (or immediately if the address assignment and configuration notification procedures are not applicable). After completion of all applicable parts, the ES shall follow the procedure for normal completion as specified in 8.3."

3.9 Add a new clause 8.5:

"8.5 Address assignment for End Systems

8.5.1 Request Address Function

The Request Address procedure is an optional procedure and, when implemented, its operation is controlled by the setting of the Address Holding Time parameter.

This procedure is applicable when (and only when) the following conditions are satisfied:

a) The End System is being initially attached to the subnetwork and is not pre-configured with knowledge of its Network Entity Title.

   or

b) The Addressing Holding Parameter for this End System is set to a value which indicates that the ES should request a new Network Entity Title.

Such a system initiates a request for a Network Entity Title, following connection establishment as outlined in 8.2.1, by forwarding a single ESH PDU omitting the "Network Address" field by placing a value "zero" in the Network Address Length indicator field.

Following the ESH PDU it shall transmitan ENC PDU. It shall then wait to receive an SRN PDU which will contain, in addition to the notification required parameter, an NET and Holding Time parameter.

After the transmission of the ESH PDU requesting the Network Entity Title, and subsequent ENC PDU, if the SRN PDU has not been received within a time equal to the Response Time Parameter, the connection shall be abandoned.

8.5.2 Record Address Function

The record address function receives the SRN PDU and extracts the assigned Network Entity Title from it. It starts an address holding timer (see clause 8.1.4) based on the address holding time parameter contained in SRN PDU. The assigned Network Entity Title 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 Network Entity Title by using the code points provided by the "zeros" in the last octet. [Note: The method of derivation is not specified in this standard.]

If the SRN PDU contains a NET Length Indicator value = "zero", indicating that the SNARE has no NET code points to assign, the ES has the option of assigning a "local" address by using AFI=49 and the DSP=SNPA. Note that "local" NSAP has significance only within the subnetwork that the ES resides.

8.5.3 Flush Address Function

If an End System acquires a Network Entity Title through the operation of the "request address" function, it must implement an address holding timer associated with this Network Entity Title based on the address holding time parameter contained in the SRN PDU. If the timer expires, the End System discards the Network Entity title and all derived NSAP addresses, and performs the "request address" function to obtain a new Network Entity Title.

[Note: This ensures that Network Entity Titles that have been erroneously or improperly assigned (as, for example, by a malfunctioning SNARE) will eventually be purged. To provide continuous service, the "request address" function may be performed before expiration of the AHT. When this function is used to obtain a "new" Network Entity Title, it is entirely possible for the "new" one to be the same as the "old", depending on how the SNAREs have implemented their Network Entity Title administrative algorithms.]

There is an additional cause to discard the Network Entity Title (and derived NSAP addresses). This is if the ES changes its SNPA for any reason."

3.10 Add the following paragraph to clause 11.1.2 immediately preceeding the paragraph beginning "If a time greater than .....":

The AHT and NET Length Indicator parameters will be set ot zero except for the conditions outlined in 11.3.

3.11 Add a new clause 11.3:

11.3 Assign Address by SNARE

A SNARE maintaining the appropriate subnetwork configuration information acts on the receipt of an ESH PDU containing a null source address followed by an ENC PDU, by determining a Network Entity Title for assignment to the End System that originated the ESH PDU. SNAREs that do not support the address administration option discard the ESH PDUs containing a null source address.

[Note: The way in which a SNARE determines Network Entity Titles according to this function is not specified. The SNARE may use any algorithm that ensures unambiguous Network Entity Title assignment. That is, no Network Entity Title may be assigned to more than one SNPA. The SNARE may assign the same NET if requested from the same subnetwork on separate occasions. For example, the SNARE may construct a Network Entity Title based on the ESH originator's source SNPA and local information, or maintain a manually administered database from which Network Entity Titles are selected according to some locally specified criterion. If more than one SNARE on a given subnetwork supports the address administration option, they must coordinate their Network Entity Title assignment algorithms to ensure that all Network Entity Titles are unambiguous.

Such procedures would be out of the scope of this standard. For illustrative purposes, however, a static algorighm for address distribution could be one in which each SNARE participating in address administration would be assigned a range of addresses to distribute.]

[Note: If a bridged LAN is partitioned into logical subnetworks by controlling which bridges propagate multicasts and broadcasts, the coordination of assignments must span the entire bridged LAN. This ensures that a change in partition does not produce a duplicate Network Entity Title. Without such a stipulation, an End System could obtain a Network Entity Title before the repartition, continue to use it afterward, and conflict with an assignment made by a different SNARE with which it previously did not share a logical subnetwork.]

The SNARE constructs an SRN PDU, placing the newly determined Network Entity Title in the appropriate field, and including a *address holding time* (AHT) parameter, which represents the amount of time that the End System may continue to use it. The NET has the structure and semantics of an NSAP address in which the last octet is "zero". [The AHT should be much larger than the value indicated in the Notification Required parameter. [See clause 8.1.3]

[Note: The SNARE should 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 Network Entity Title as an NSAP address. The End System configuration is recorded only via the "record configuration" function described in clause 11.1.]

3.12 Insert a new paragraph into clause 12.1.4 following the first paragraph:

"In the SRN PDU it specifies the NET being assigned to the ES that originated the request for an NET."

3.13 Modify Figure 12 with the addition of the AHT and NET parameters as shown:

	OCTET
Network Layer protocol Identifier	1
Version Number	2
PDU Type	3
Notification Required	4 5
Address Holding Time (AHT)	6
NET Length Indicator	7
NET Parameter Value	8 j-1