Date: 1992-07-21

Information processing systems — Data communications — Protocol for providing the connectionless–mode network service

AMENDMENT 6 : Addition of an Echo function to ISO/IEC 8473

0. Introduction

This amendment to ISO/IEC 8473 adds an "echo" network-diagnostic function to the protocol. The Echo function enables an ISO/IEC 8473 network-entity to generate a special type of PDU, the Echo Request PDU, which is handled by intermediate systems in the same way as a normal DT PDU (e.g., with respect to routing and other protocol processing); but which, when it reaches its destination, is "echoed" back to the sender, rather than delivered to a Network service user in an NSDU. Such a function is expected to be used by Network layer management for diagnostic purposes. It is in all cases entirely a matter for Network layer management to interpret the results of performing the Echo function.

1. Scope and field of application

Modify the first sentence of clause 1 to read as follows.

> This International Standard specifies a protocol which is used to provide the connectionless-mode Network service as described in ISO/IEC 8348/Add.1, and to perform certain Network layer management functions.

2. References

This Amendment makes no changes to clause 2 of ISO/IEC 8473.

3. Definitions

This Amendment makes no changes to clause 3 of ISO/IEC 8473.

4. Abbreviations

Add the following entries to the list of abbreviations in clause 4.2, Protocol data units.

ERQ PDU	Echo request protocol data unit
ERP PDU	Echo reply protocol data unit

5. Overview of the protocol

This Amendment makes no changes to clause 5 of ISO/IEC 8473.

6. Protocol functions

Add the following new clauses as 6.19 and 6.20. Renumber the current clause 6.19 to be 6.21, and change references to "6.19" to "6.21". In the first sentence of the renumbered clause 6.21, change "6.1 through 6.18" *to* "6.1 through 6.20".

6.19 Echo request function

This function is invoked by Network layer management to obtain information about the dynamic state of the Network layer with respect to (a) the reachability of specific network-entities, and (b) the characteristics of the path or paths that can be created between network-entitites through the operation of Network layer routing functions.

When invoked, the Echo request function causes an Echo request (ERQ) PDU to be created. The ERQ PDU shall be constructed and processed by ISO/IEC 8473 network-entities in end systems and intermediate systems in exactly the same way as the DT PDU, with the following caveats:

a) Since the Echo request function is invoked by Network layer management, rather than by a N-UNITDATA request, the information available to the PDU composition function (clause 6.1) consists of current state, local information, and information supplied by Network layer management; the references in clause 6.1 to information obtained from parameters of the N-UNITDATA request do not apply to the composition of an ERQ PDU.

b) The source and destination address fields of the ERQ PDU shall contain, respectively, a Network entity title of the originating network-entity and a Network entity title of the destination network-entity (which may be in either an end system or an intermediate system).

NOTE: A Network entity title is syntactically indistinguishable from an NSAP address. The additional information in an NSAP address, if any, beyond that which is present in a Network entity title, is relevant only to the operation of the PDU decomposition function in a destination end system, and therefore is not needed for the processing of an ERQ PDU (from which no N-UNITDATA indication is ever produced). The fact that the source and destination address fields of the ERQ PDU contain NETs rather than NSAP addresses therefore does not affect the processing of an ERQ PDU by any network-entity.

c) When an ERQ PDU has reached its destination, as determined by the Header format analysis function (clause 6.3), the Echo response function (clause 6.20), rather than the PDU decomposition function (clause 6.2), shall be invoked. It is a local matter whether or not this involves an interaction with Network layer management.

NOTE: Since the Echo response function is a type 2 function (see clause 6.21), the destination network-entity may or may not perform the Echo response function upon receiving an ERQ PDU. Network layer management must therefore consider, when the Echo request function is invoked, that non-receipt of a corresponding Echo response PDU may be due to non-support of the Echo response function by the destination network-entity.

d) The maximum length of the ERQ PDU is equal to the maximum length of the Echo response PDU minus the maximum length of the Echo response PDU header. This ensures that the entire ERQ PDU can be contained within the data field of the Echo response PDU (see clause 6.20).

e) The data part of the ERQ PDU may, as a local matter, contain zero or more octets with any values (subject to the overall maximum length of the ERQ PDU specified in (d) above). If the first octet of the data part contains the binary value 1000 0001 (the NLPID for ISO/IEC 8473), then the first n octets of the data part (where n is the value of the second octet of the data part) shall contain an entire Echo response PDU header, in which every field in the fixed part and address part, except the segment length and checksum fields, must contain a valid value. The "more segments" flag shall have the value zero. If and only if the "segmentation permitted" flag is set to 1, the segmentation part shall be present. The options part, if present, may contain any of the options described in clause 7.5.

NOTE: This ERP PDU header, if present in the data part of an ERQ PDU, may be, but is not required to be, used in whole or in part by the destination network-entity to compose an ERP PDU (see clause 6.20 (d)).

NOTE: If this information is *not* present in the data part of the ERQ PDU, it may not be possible for the Echo response function of the destination network-entity to select an appropriate value for the "lifetime" field of the ERP PDU.

6.20 Echo response function

This function is performed by a network-entity when it has received an ERQ PDU that has reached its destination, as determined by the Header format analysis function (clause 6.3) — that is, an ERQ PDU which contains, in its destination address field, a Network entity title that identifies the network-entity.

NOTE: For a network-entity in an end system, the NSAP address of any NSAP in that end system to which the network-entity is attached is also a valid NET that identifies the network-entity; therefore, an Echo request sent to a network-entity in an end system may use the NSAP address of any NSAP in that end system as the value of the destination address field of the ERQ PDU.

When invoked, the Echo response function causes an Echo response (ERP) PDU to be created. The ERP PDU shall be constructed and processed by ISO/IEC 8473 network-entities in end systems and intermediate systems in exactly the same way as the DT PDU, with the following caveats:

a) Since the Echo response function is not invoked by a N-UNITDATA request, the information available to the PDU composition function (clause 6.1) consists of current state, local information, and information contained in the corresponding ERQ PDU; the references in clause 6.1 to information obtained from parameters of the N-UNITDATA request do not apply to the composition of an ERP PDU.

b) The source address field of the ERP PDU shall contain the value of the destination address field of the corresponding ERQ PDU. The destination address field of the ERP PDU shall contain the value of the source address field of the corresponding ERQ PDU.

NOTE: The observation contained in the NOTE following clause 6.19 (b) applies also to the ERP PDU.

c) The ERQ PDU, in its entirety, shall be placed into the data part of the ERP PDU. The data part of the ERP PDU shall contain *only* the corresponding ERQ PDU.

d) If the data part of the ERQ PDU contains an ERP PDU header (see clause 6.19 (e)), the PDU composition function may, but is not required to, use some or all of the information contained therein to select values for the fields of the ERP PDU header. In this case, however, the value of the "lifetime" field contained in the ERP PDU header in the ERQ PDU data part *must* be used as the value of the lifetime field in the ERP PDU. The values of the segment length and checksum fields shall be computed by the network-entity regardless of the contents of those fields in the ERP PDU header in the data part of the ERQ PDU.

e) The options part of the ERP PDU may contain any (or none) of the options described in clause 7.5. The values for these options, if present, are determined by the network-entity as a local matter. They may be, but are not required to be, either identical to or derived from the corresponding options in the ERQ PDU and/or the ERP PDU header contained in the data part of the ERQ PDU (if present). The source routing option in the ERP PDU shall not be identical to (copied from) the source routing option in the ERQ PDU header. If the recording of route option in the ERP PDU is identical to (copied from) the recording of route option in the ERQ PDU header, the second octet of the parameter value field shall be set to the value 3.

f) It is a local matter whether or not the destination network-entity performs the lifetime control function on an ERQ PDU before performing the Echo response function. The destination network-entity shall make the same decision in this regard that it would make, as a local matter, for a DT PDU in accordance with clause 6.4.

6.21 Classification of functions

Add the following rows to Table 4 between the rows for "complete route recording" and "partial source routing".

Echo request	2	2	N/A
Echo response	2	2	N/A

7. Structure and encoding of PDUs

Add the following entries to Table 5.

	Type Code				
	5	4	3	2	1
ERQ PDU	1	1	1	1	0
ERP PDU	1	1	1	1	1

Add the following as new clauses 7.10 and 7.11 at the end of clause 7.

7.10 Echo request (ERQ) PDU

The ERQ PDU has the same format as the DT PDU (see clause 7.7).

7.11 Echo response (ERP) PDU

The ERP PDU has the same format as the DT PDU (see clause 7.7).