Appendix 1. Network Management

a. TRIGGER EVENTS AND MESSAGE DEFINITIONS

i. NMQ - Network management query

One system needs network information from another system:

The NMQ (Network Management Query) message is used by one system to make system-level requests for information or action to another system. It has three segments, the NCK segment (network clock), the NST segment (network statistics), and the NSC segment (network status change). An example of the last type, NSC (network status change) would be an application or system startup/shut down request. At least one of these three segments must be present in the NMQ message. If a segment is present in the NMQ message, the corresponding segment needs to be present in the NMR message to return the requested data or status.

a)The purpose of the NCK segment is to allow the various systems on the network to synchronize their system clocks (system date and time).

b)The purpose of the NST segment is to allow network statistical information to be passed between the various systems on the network. Although some of the fields in this segment refer to portions of lower level protocols, they contain information that can be used be network management applications monitoring the state of various network links. All the data fields in the NST (network statistics) are optional, and the data elements maintained by any system are to be negotiated at a particular site.

c)The NSC segment can be used to request the start-up, shut-down, and/or migration (to a different CPU or file-server/file-system) of a particular application. It can also be used in an unsolicited update from one system to another to announce the start-up, shut-down, or migration of an application.

NMQ	Network Management Query	Chapter/ Appendix
MSH	Message Header	2
[QRD	Query Definition	2
[QRF]]	Query Filter	2
{[NCK]	Network System Clock	C
[NST]	Network Statistics	C
[NSC]}	Network Status Change	C

NMR	Network Management Response	Chapter/ Appendix
MSH	Message Header	2
MSA	Message Acknowledgement	2
[ERR]	Error	2
[QRD]	Query Definition	2
{[NCK]	System Clock	C
[{NTE}]	Notes and Comments	2
[NST]	Statistics	C
[{NTE}]	Notes and Comments	2
[NSC]	Network Status Change	C
[{NTE}] }	Notes and Comments	2

iii. NMD - Network management data

One system creates an unsolicited update (UU) Network Management Data message (NMD) to transmit network management information to another system. In this case, the initiating system sends an NMD message as an unsolicited update (UU) containing network management information to a receiving system, which responds with a generic acknowledgement message (ACK).

For example, a system going down for backups (or starting up again after backups) might issue such a message to one or more applications. A system switching to another CPU or file-server may also need to use this transaction to notify other systems.

NMD	Network Management Data	Chapter/ Appendix
MSH	Message Header	2
{		
[NCK	System Clock	C
[{NTE}]]	Notes and Comments	2
[NST	Statistics	C
[{NTE}]]	Notes and Comments	2
[NSC	Network Status Change	C
[{NTE}]]	Notes and Comments	2
}		

ACK	Generic Acknowledgement	Chapter/ Appendix
MSH	Message Header	2
MSA	Message Acknowledgement	2

c. NETWORK MANAGEMENT MESSAGE SEGMENTS

The following segments are needed by the network management messages.

i. NCK - system clock

The NCK segment is used to allow the various systems on the network to synchronize their system clocks (system date and time).

Figure C-1 NCK Attributes

SEQ	LEN	DT	R/O	RP/#	TBL#	ITEM#	ELEMENT NAME
1	26	TS	R			00742	System Date/Time

C.2.1.0 NCK field definitions

(1) System date/time (TS) 00742

Definition: As HL7 time stamp. It is strongly recommended that seconds be included. If the message contains an NST or NSC segment, the NCK segment is optional. If the NCK segment is present, this field is required. If present in the NMQ message, or the unsolicited NMD message, it contains the system date/time of the sending system. If present in the NMR response message, it contains the responding system's date/time.

(2) NCK use notes

If this message is to be used to automatically reset/correct system clocks, it is recommended that the system or administrative personnel initiating the NMQ with the NCK segment have the authority to correct the clock (system date and time) for the other systems on the network. This is important in order to avoid the obvious confusion of multiple systems attempting to resynchronize each other's clocks.

If this message is used only to gather information on the various system's clocks, it is still important for an administrative procedure to be worked out to avoid conflicts when resetting clocks.

iii. NST - statistics

The NST segment allows network statistical information to be passed between the various systems on the network. Some fields in this segment refer to portions of lower level protocols; they contain information that can be used by network management applications monitoring the state of various network links.

Figure C-2 NST Attributes

SEQ	LEN	DT	R/O	RP/#	TBL#	ITEM#	ELEMENT NAME
1	1	ID	R			00743	Statistics Available
2	30	ST				00744	Source Identifier
3	3	ID				00745	Source Type
4	26	TS				00746	Statistics Start
5	26	TS				00747	Statistics End
6	10	NM				00748	Receive Character Count
7	10	NM				00749	Send Character Count
8	10	NM				00750	Messages Received
9	10	NM				00751	Messages Sent
10	10	NM				00752	Checksum Errors Received
11	10	NM				00753	Length Errors Received
12	10	NM				00754	Other Errors Received
13	10	NM				00755	Connect Timeouts
14	10	NM				00756	Receive Timeouts
15	10	NM				00757	Network Errors

C.2.2.0 NST field definitions

(1) Statistics available (ID) 00743

Definition: If the responding system does not keep any statistics, this field has a value : "N". If the value "N" is specified, the response message is used to signify to the initiating application that the particular link is operational (and fields 2-15 will be empty in the response message). If the responding system does keep statistics, this field has the value "Y", fields 4 and 5 are required, (and the response message will contain one or more non-null fields in the range 2-3, 6-15).

(2) Source identifier (ST) 00744

Definition: This field is used to identify a particular lower level link (e.g., a port number).

(3) Source type (ID) 00745

Definition: This field is used to identify (in certain systems) whether a lower level source identifier is an initiate or accept type.

(4) Statistics start (TS) 00746

Definition: Date/time stamp of the start of the collection of the statistics reported in fields 6-15 of this segment. It is strongly recommended that this value include seconds.

(5) Statistics end (TS) 00747

Definition: Date/time stamp of the end of the statistics collection period reported in fields 6-15 of this segment. It is strongly recommended that this value include seconds.

(6) Receive character count (NM) 00748

Definition: Number of characters received.

(7) Send character count (NM) 00749

Definition: Number of characters sent.

(8) Messages received (NM) 00750

Definition: Number of messages received.

(9) Messages sent (NM) 00751

Definition: Number of messages sent.

(10) Checksum errors received (NM) 00752

Definition: Number of messages received with checksum errors.

(11) Length errors received (NM) 00753

Definition: Number of messages received with length errors.

(12) Other errors received (NM) 00754

Definition: Number of "other" invalid messages received (excluding length and checksum errors).

(13) Connect timeouts (NM) 00755

Definition: Number of connect timeout errors.

(14) Receive timeouts (NM) 00756

Definition: Number of timeouts while waiting for a response to an initiated message.

(15) Network errors (NM) 00757

Definition: Number of network errors in response to an initiated message.

(16) NST use notes

Fields 2-15. These are all marked optional since the statistics kept on a particular link and negotiated between the two systems in question will vary. Not all values will apply to each system. Some values are concerned with the type of port, and some values pertain to the lower level protocol.

v. NSC - status change

The NSC segment can be used to request the start-up, shut-down, and/or migration (to a different cpu or file-server/file-system) of a particular application. It can also be used in an unsolicited update from one system to another to announce the start-up, shut-down, or migration of an application.

Figure C-3 NSC Attributes

SEQ	LEN	DT	R/O	RP/#	TBL#	ITEM#	ELEMENT NAME
1	4	ID	R			00758	Network Change Type
2	30	ST				00759	Current CPU
3	30	ST				00760	Current Fileserver
4	30	ST				00761	Current Application
5	30	ST				00762	Current Facility
6	30	ST				00763	New CPU
7	30	ST				00764	New Fileserver
8	30	ST				00765	New Application
9	30	ST				00766	New Facility

C.2.3.0 NSC field definitions

(1) Network change type (ID) 00758

Definition: Type of change being requested (if NMR query) or announced (if NMD unsolicited update). Suggested values are: "SU" - Start up; "SD" - Shut down; "M" - migrates to different CPU. Implies that "new" version starts up with no loss or duplication of data as old one is shutting down (if possible).

(2) Current CPU (ST) 00759

Definition: A site specific name for the current CPU.

(3) Current fileserver (ST) 00760

Definition: A site-specific name for the current fileserver or file system used by this application.

(4) Current application (ST) 00761

Definition: A site specific name available to identify the "current" application process used for interfacing with lower level protocols. To be used in conjunction with the sending/receiving system and facility values in the MSH.

(5) Current facility (ST) 00762

Definition: A site specific name for the current facility used by this application. To be used in conjunction with the values for the sending/receiving system and facility values in the MSH.

(6) New CPU (ST) 00763

Definition: A site specific name for the new CPU.

(7) New fileserver (ST) 00764

Definition: A site specific name for the new fileserver or file system used by this application.

(8) New application (ST) 00765

Definition: A site specific name available to identify "new" application processes used for interfacing with lower level protocols. To be used in conjunction with the sending/receiving system and facility values in the MSH.

(9) New facility (ST) 00766

Definition: A site specific name for the new facility used by this application. To be used in conjunction with the values for the sending/receiving system and facility values in the MSH.

(10) NSC use notes

Fields 2-9. These are "n/a" if the type of change being requested or reported is start-up or shut-down. If the change is of type "M", at least one of fields 2-5 must be different from its corresponding field in range 6-9.

Fields 4-5, 8-9. See definitions for the MSH, message header segment, in Chapter 2, (Control Section), for fields 3-4, for system and facility. "Application" is available for interfacing with lower level protocols. "Facility" is entirely site defined.

Fields 2-3, 6-7. Entirely site-defined.

vii.
C.2.4 QRD - query definition

C.2.4.0 QRD use notes

This segment is defined in chapter 2. It is optional in the NMQ message. If present, *QRD-1-query date/time*, *QRD-2-query format code*, *QRD-3-query priority*,*QRD-9-what subject filter*, and *QRD-12-what department data code* should be used.

Suggested values for *QRD-9-what subject filter* are NCK, NST, or NSC. If NSC is used, then suggested values for *QRD-12-what department data code* should be taken from the user-defined table for *NSC-1-network change type*.

Since these are network management transactions, *QRD-2-query format code* should be **R** (record oriented), *QRD-3-query priority* should be **I** (immediate).

The other fields in this segment are optional.