ARH6879

CONTROL DATA DISTRIBUTED COMMUNICATION NETWORK (CDCNET)

INTRANET 3A

EXTERNAL REFERENCE SPECIFICATION

04/15/85

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1.0 INTRODUCTION

1.0 INTRODUCTION

The Intranet layer (3A) software provides an interface between
individual network solutions software (layers 1 and 2) and
higher layer CDCNET software. Layers above Intranet and
various management entities communicate with (or know about)
individual network solutions software through Intranet. The
Intranet layer is also known as Generic 3A, generic in the
sense that a single interface is defined for users of 3A
regardless of the underlying network solution. That is, a
user of Generic 3A is not concerned with the specifics of
whether the underlying layer two is Ethernet, MCI, or HDLC.
The 3A user simply interfaces to Generic 3A, not to the HDLC,
Ethernet, or MCI 3A's. In particular, Intranet software or
Generic 3A software refers to the layer 3A software associated
with the Ethernet, Mainframe Channel and HDLC line network
solutions.

1.1 PURPOSE

The Intranet layer (3A) provides the interface between higher
layer CDCNET software and the layer two software (stream
service routines) for the various network solutions.

1.2 REFERENCES

1. CDC Network Architecture GDS (ARH4243)

2. Xerox Internet Entity ERS (ARH 6221)

3. Routing M-E ERS (ARH 6264)

4. Initialization M-E ERS (ARH 5377)

5. HDLC SSR ERS

6. Ethernet Serial Channel (ESCI) ERS

1.0 INTRODUCTION
1.2 REFERENCES
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    7. MCI ERS (ARH 5370)

    9. COMMAND M-E ERS (ARH 5451)

2.0 FEATURE/SERVICE OVERVIEW

2.0 FEATURE/SERVICE OVERVIEW

2.1 FEATURES/SERVICES

The services offered by the Intranet 3A are

1) Sap management services
   - opening and closing of 3A saps

2) Data transfer services
   - data transfer to and from network solutions

3) Status indication services.
   - 3A status update indication

The features provided by Intranet 3A include timing out old
entries in outgoing queues and addition /removal of 3A as well
as lower layer headers in certain cases.

The users of Intranet services call a different subroutine
based on the specific service desired. However the same
subroutine is called to obtain the same service on different
network solutions. For example, if layer 3B software wants
to send a datagram on Ethernet or the HDLC network, it
calls the same subroutine in Intranet.

Each user of Intranet services identifies itself by opening a
3A SAP and providing a protocol type. This protocol type is
used to route incoming messages to a specific user of Intranet.
In addition to the protocol type, the user also provides
addresses of procedures to be called to receive the following
indications.

   .   Data/Broadcast indication
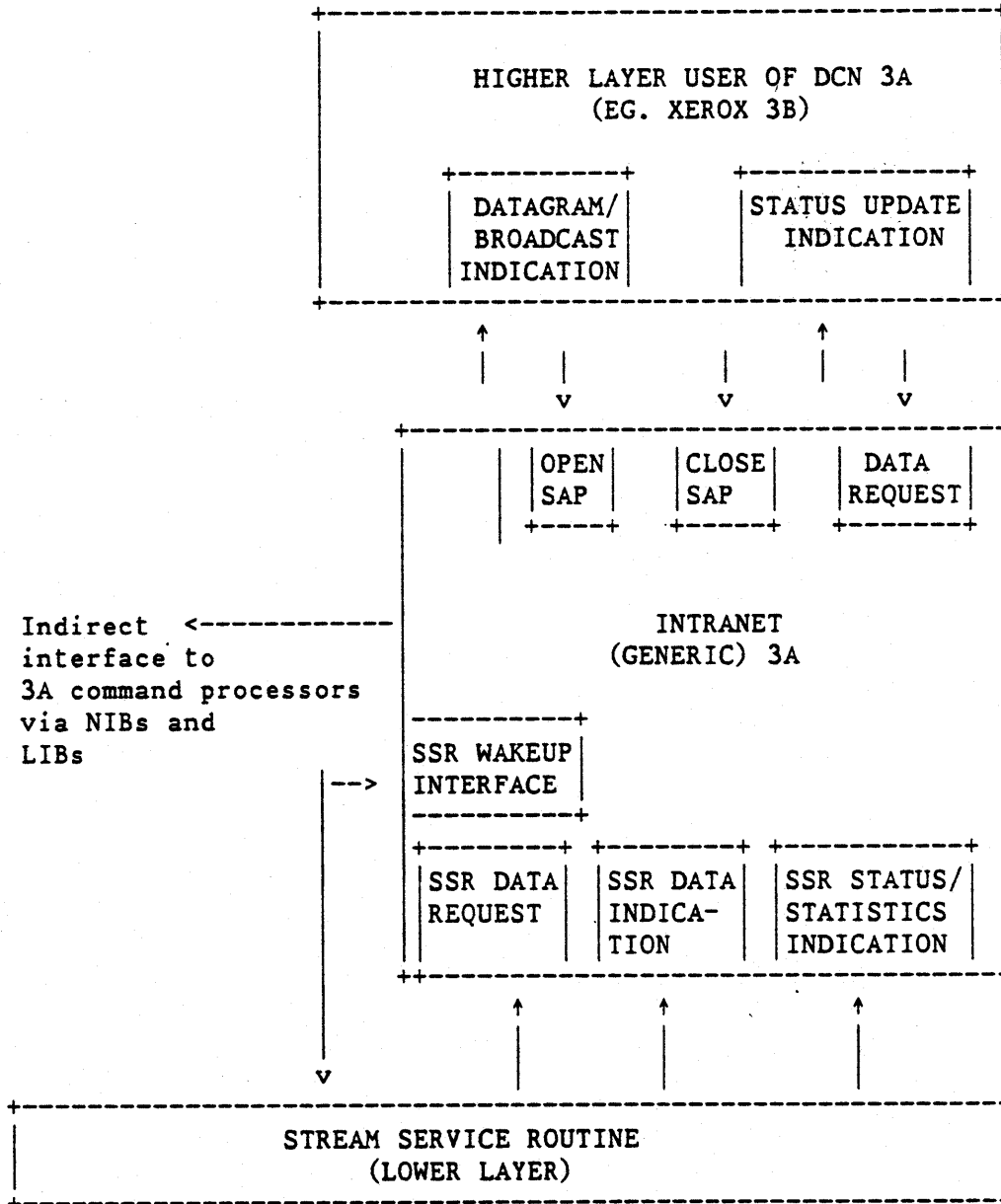   .   Status update indication

Intranet services are provided via procedure calls. Different
procedures exist for each service. Addresses of these procedures
are globally known and are linked in at link/load time.

2.0 FEATURE/SERVICE OVERVIEW
2.2 FUNCTIONAL RELATIONSHIPS

2.2 FUNCTIONAL RELATIONSHIPS

2.2.1 DESCRIPTION

```
            +--------------------------------------------------+
            |                                                  |
            |          HIGHER LAYER USER OF DCN 3A             |
            |              (EG. XEROX 3B)                      |
            |                                                  |
            |    +-----------+          +--------------+       |
            |    |DATAGRAM/  |          |STATUS UPDATE |       |
            |    |BROADCAST  |          |  INDICATION  |       |
            |    |INDICATION |          |              |       |
            +--------------------------------------------------+
                      ^    |            |     ^      |
                      |    |            |     |      |
                      |    v            v     |      v

            +--------------------------------------------------+
            |      |OPEN|    |CLOSE|    | DATA    |             |
            |      |SAP |    |SAP  |    | REQUEST |             |
            |      +----+    +-----+    +--------+             |
            |                                                  |
            |               INTRANET                           |
Indirect <------------      (GENERIC) 3A                       |
interface to                                                   |
3A command processors                                          |
via NIBs and                                                   |
LIBs           +----------+                                    |
               |SSR WAKEUP|                                    |
          -->  |INTERFACE |                                    |
               +----------+                                    |
               +---------+ +---------+ +------------+          |
               |SSR DATA | |SSR DATA | |SSR STATUS/ |          |
               |REQUEST  | |INDICA-  | |STATISTICS  |          |
               |         | |TION     | |INDICATION  |          |
            ++--------------------------------------------------+
                    ^          ^            ^
                    |          |            |
              v     |          |            |
            +--------------------------------------------------+
            |            STREAM SERVICE ROUTINE                |
            |                (LOWER LAYER)                     |
            +--------------------------------------------------+
```

2.0 FEATURE/SERVICE OVERVIEW
2.2.2 DATA STRUCTURES

2.2.2 DATA STRUCTURES

NETWORK INFORMATION BLOCK

The Network Information Block(NIB) is a table that exists
for each configured network solution. This table
contains network related information needed to provide the
various services and functions associated with that network
solution and is the key interface data structure between Generic
3A and its higher layer users.

 A NIB is created when a command to define a network is
executed by the 3A command processors, and contains
information concerning the network. The define command
parameters can be used to provide the values of different fields
in the NIB. Default values are used for the fields whose values
are not provided via the command parameters.
For a particular DI all the NIBs will be linked together
in a data structure called the Network Solution List (NSL). This
data structure facilitates the search for a particular NIB.
Each NIB is also linked to its associated Link Information Block
(LIB) which will be explained in the next section.

 When a command to cancel a particular network is executed,
the corresponding NIB and the pointer to this NIB from
any associated LIB are deleted.

2.0 FEATURE/SERVICE OVERVIEW
2.2.2 DATA STRUCTURES

LINK INFORMATION BLOCK

The Link Information Block(LIB) is a table that exists
for each configured layer two link. This table contains
link related information needed to provide the services and
functions associated with a particular link. It is also the
key interface data structure used by the SSR in communicating
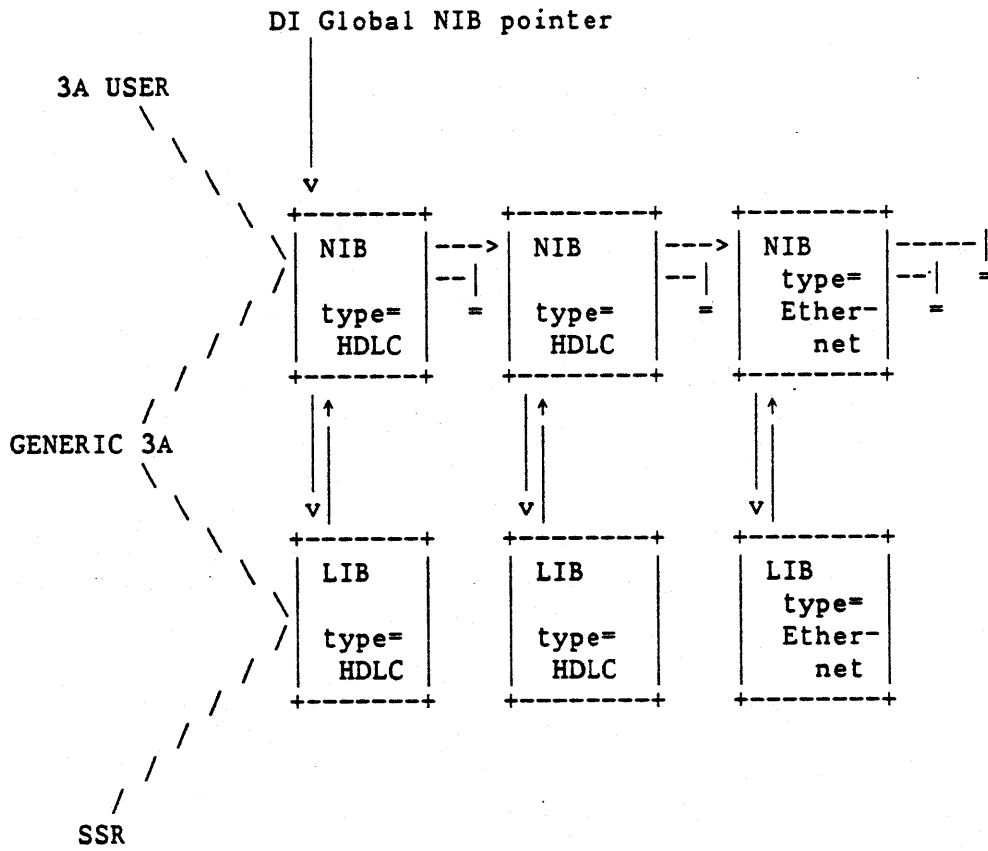with Generic 3A.

 A LIB is created when a command to define a trunk is
executed, and it contains information concerning the physical
layer, link related information and 3A related information.
As in the case for NIBs, the LIBs for a particular DI are
also linked together through the Network Solution List.
The address of the first entry in this list is stored
in the System Data Table.

 A LIB is deleted when a command to cancel the corresponding
trunk is executed.

2.0 FEATURE/SERVICE OVERVIEW
2.2.2 DATA STRUCTURES

NIB/LIB DATA STRUCTURE EXAMPLE:

TWO HDLC LINKS, ONE ETHERNET LINK

```
                              DI Global NIB pointer
                                       |
          3A USER                      |
                 \                     |
                  \                    |
                   \                   v
                    \    +-------+        +--------+        +--------+
                     \   | NIB   |---->   | NIB    |---->   | NIB    |------|
                     /   |       |--|     |        |--|     |  type= |--| =
                    /    | type= |   =    | type=  |   =    |  Ether-|   =
                   /     | HDLC  |        | HDLC   |        |  net   |
                  /      +-------+        +--------+        +--------+
                 /          |  ↑            |  ↑              |  ↑
        GENERIC 3A          |  |            |  |              |  |
                 \          |  |            |  |              |  |
                  \         v  |            v  |              v  |
                   \     +-------+        +--------+        +--------+
                    \    | LIB   |        | LIB    |        | LIB    |
                     \   |       |        |        |        |  type= |
                     /   | type= |        | type=  |        |  Ether-|
                    /    | HDLC  |        | HDLC   |        |  net   |
                   /     +-------+        +--------+        +--------+
                  /
                 /
              SSR
```

2.0 FEATURE/SERVICE OVERVIEW
2.3 UTILISED EXTERNAL INTERFACES

2.3 UTILISED EXTERNAL INTERFACES

The direct external interface is the SSR interface, and
it describes the Intranet interfaces with the layer two
Stream Service Routines (i.e. Ethernet, HDLC, and the Main
Frame Channel Interface SSRs).

2.3.1 SSR DATA REQUEST

This service allows the Intranet to transmit the next data unit
on a specific network solution. This service is initiated when
the SSR calls the Intranet procedure, ssr_data_request to obtain
the next data unit to be transmitted. If a data unit is not
available for transmission, Intranet sets the ssr_sleeping field
in the SSR's Link Information Block(LIB) to true. The SSR is
then notified when a data unit is available (see SSR WAKEUP
INTERFACE).

This routine is known to the SSR through field ssr_data_req_proc
of the SSR's Link Information Block. The SSR requests a 3A data
unit with a CALL/RETURN.

STREAM SERVICE ROUTINE DATA REQUEST

        INPUT PARAMETERS :

        network_lib_ptr - pointer to Link Information
                          block (LIB)

        OUTPUT PARAMETERS :

        data_ptr - pointer to message
                   {NIL if there is no message in the 3A queue for SSR

    PROCEDURE ssr_data_request (
        network_lib_ptr: ↑l3_lib_type;
    VAR data_ptr: buf_ptr);

CONTROL DATA PRIVATE

2.0 FEATURE/SERVICE OVERVIEW
2.3.2 SSR DATA INDICATION

2.3.2 SSR DATA INDICATION

This service allows the SSR to notify Generic 3A of the next
data unit received on the network solution. This service is
provided via a procedure call from the SSR to the Intranet
procedure, ssr_data_indication. (The address of this procedure
is provided via the Generic 3A portion of the Link Information
Block). If protocol type used in the header passed by SSR is
invalid then this event is logged and the message is released
in order to prevent buffer congestion.

   INTRANET SSR DATA INDICATION

      INPUT PARAMETERS :

       network_lib_ptr - pointer to Link Information
                     Block(LIB)
       data_ptr   - pointer to message

      OUTPUT PARAMETERS :

      NONE

   PROCEDURE ssr_data_indication (
           network_lib_ptr: ↑l3_lib_type;
     VAR data_ptr: buf_ptr);

2.0 FEATURE/SERVICE OVERVIEW
2.3.3 SSR STATUS INDICATION

2.3.3 SSR STATUS INDICATION

The SSR provides Generic 3A with any status changes via a proce-
dure call to this routine. This routine is known to the SSR
through field ssr_status_req_proc of the SSR's Link Information
Block. The SSR provides 3A status changes with a CALL/RETURN.
If the link status passed be SSR is unknown then this event
is logged.

   INTRANET SSR STATUS INDICATION

      INPUT PARAMETERS :

       network_lib_ptr - pointer to Link Information Block

       link_status - status of link

      OUTPUT PARAMETERS :

       NONE

   PROCEDURE ssr_status_indication (
         network_lib_ptr: ↑13_lib_type;
         link_status: link_status_type);

2.0 FEATURE/SERVICE OVERVIEW
2.3.4 SSR WAKEUP

2.3.4 SSR WAKEUP

This interface is activated whenever the Generic 3A Data Request
Routine determines that the SSR task is in an inactive state,
waiting for the next data unit. This is determined by the
ssr_sleeping field of the SSR's Link Information Block (LIB).
The field ssr_sleeping is a boolean defined to be true if the SSR
is sleeping(inactive) or is false if the SSR is active. An SSR
WAKEUP Intertask message is sent to the SSR specifying a work
code(wc) of ssr_wakeup.

3.0 DESCRIPTION OF SERVICES/FEATURES

3.0 DESCRIPTION OF SERVICES/FEATURES

3.1 OPEN 3A SAP

3.1.1 DESCRIPTION

This service allows the Intranet user to identify itself
and to associate itself with a specific protocol type.
This service is obtained by calling the Intranet procedure,
open_3A_sap.
The procedure is called to open a SAP for all available
network solutions. It is also used to provide addresses
of user procedures to be called to provide various
indications.
The return code parameter conveys the success or failure
of the open SAP request as well as the reason for failure.
A single SAP is opened for each user of Intranet.

3.1.2 PROGRAM INTERFACE

The user opens a 3A SAP with a CALL/RETURN.

INTRANET OPEN SAP

INPUT PARAMETERS :

protocol_type - protocol type to be associated with sap.
data_ind_proc - procedure pointer for Data/Broadcast
                indication.
status_ind_proc - procedure ptr for status update indi-
                cation.

OUTPUT PARAMETERS :

sap_id - sap id number associated with user of
        specified protocol type (used on subsequent
        data request and close sap calls).
call_status - success or failure, reason for failure.

PROCEDURE open_3A_sap (protocol_type: protocol_type_range;
        dataind_proc: 13b_datagram_prc_type;

3.0 DESCRIPTION OF SERVICES/FEATURES
3.1.2 PROGRAM INTERFACE

```
        statusupdind_proc: 13b_status_prc_type;
    VAR sap_id_nbr: sap_id_type;
    VAR call_status: 13A_status_type);
```

3.1.3 ERROR RECOVERY

Different users of Intranet are not allowed to associate them-
selves with the same protocol type. Therefore, a request by
a user to open a SAP with a protocol type for which a SAP is
already opened by another user is rejected and logged via a
log message. An appropriate status is also returned to the
corresponding user.

3.0 DESCRIPTION OF SERVICES/FEATURES
3.2 CLOSE 3A SAP

3.2 <u>CLOSE 3A SAP</u>

3.2.1 DESCRIPTION

This service allows the Intranet user to close a currently open
Intranet SAP. It is obtained via a procedure call to the
Intranet procedure, close_3A_sap.

3.2.2 PROGRAM INTERFACE

The user closes a 3A sap with a CALL/RETURN.

  INTRANET CLOSE SAP

      INPUT PARAMETERS :

        sap_id_nbr - sap id number assigned by previous
                     call to the open_3A_sap procedure

      OUTPUT PARAMETERS :

        call_status - success or failure (reason for
                       failure)

    PROCEDURE close_3A_sap (sap_id_nbr: sap_id_type;
      VAR call_status: 13A_call_status_type);

3.2.3 ERROR RECOVERY

If the sap to be closed is already closed or if it does not
exist then this event is logged and a status is returned to
the user.

3.0 DESCRIPTION OF SERVICES/FEATURES
3.3 GENERIC 3A DATA REQUEST

3.3 GENERIC 3A DATA REQUEST

3.3.1 DESCRIPTION

This service allows the Intranet user to send a datagram on a
specific network solution. After adding an Intranet 3A header
according to network solution type, the datagram message is
queued via the common subroutine, message enqueue. If the
ssr is waiting for a message (See LIB field ssr_sleeping) a
wake-up message is sent via the send_normal common subroutine.

3.3.2 PROGRAM INTERFACE

The user request data with a CALL/RETURN.

   INTRANET DATA REQUEST

      INPUT PARAMETERS :

         network_id - Network ID of the network solution
         destination_system_id - System ID of the
                                 destination system
         sap_id_nbr - sap id number (assigned by open_sap_3A
                      procedure)
         data_ptr - pointer to the data unit to be sent

      OUTPUT PARAMETERS :

         call_status - call status of request

   PROCEDURE data_request_3A (network_id: net_id_type;
         destination_system_id: sys_id_type;
         sap_id: sap_id_type;
    VAR data_ptr: buf_ptr;
    VAR call_status: 13A_call_status_type);

3.3.3 ERROR RECOVERY

If the network_id is unknown or the sap does not exist or the
corresponding network is not up then this event is logged and
the data is returned back to the user. The user is also notified
with a status.

3.0 DESCRIPTION OF SERVICES/FEATURES
3.4 GENERIC 3A DATA INDICATION

3.4 GENERIC 3A DATA INDICATION

3.4.1 DESCRIPTION

This service allows the Intranet user to receive the incoming
datagram data unit which has the same protocol type as the one
associated with the user. The service is obtained via a two step
process.

> 1). The Intranet user provides the address of a
>   procedure that is called to provide Data/Broadcast
>   indication. This occurs once during the
>   open_3A_sap procedure.

> 2). Intranet, on receipt of a datagram data unit with
>   matching protocol type, calls this procedure.

It is assumed that the user runs on a non_preemptable task in
order to prevent deadlocks and other errors.

3.4.2 PROGRAM INTERFACE

A description of the "pointer to procedure" parameter specified
by the Intranet user on the open 3A SAP call for receipt of Data/
Broadcast indication follows. Also see section 8.0, NEW DATA
TYPES, for a description of this data type, 13b_datagram_prc_type.

INTRANET DATA INDICATION

        PARAMETERS :
        multicast - specifies if this is a broadcast or a datagram
                    network (broadcast/true, datagram/false).
        receiving_network_id - Network ID of the network solution
                                receiving the data unit.
        originating_system_id - system id of system sending data unit.
        data_ptr - pointer to message data unit.

    PROCEDURE data_indication_3A (
        multicast: boolean;
        receiving_network_id: net_id_type;
        originating_system_id: system_id_type;
        data_ptr: buf_ptr);

3.0 DESCRIPTION OF SERVICES/FEATURES
3.5 GENERIC 3A STATUS UPDATE INDICATION

3.5 GENERIC 3A STATUS UPDATE INDICATION

3.5.1 DESCRIPTION

This service allows the Intranet user to obtain the status of
reques.ted network solutions following the opening of a 3A SAP.
It subsequently allows the Intranet user to obtain any unsolic-
ited status changes to those requested networks. The service is
obtained via a two step process.

> 1). The Intranet user provides the address of a
>   procedure that is called to provide Status Update
>   indication. This occurs once during the
>   open_3A_sap procedure.

> 2). Intranet, on receipt of a status update from the SSR
>   calls this procedure.

3.5.2 PROGRAM INTERFACE

A description of the "pointer to procedure" parameter specified
by the Intranet user on the open 3A SAP call for receipt of Status
Update indication follows. Also see section 8.0, NEW DATA TYPES,
for a description of this data type, 13b_status_proc_type.

  INTRANET STATUS UPDATE INDICATION

     PARAMETERS :

       network_nib_pointer - pointer to Network Information Block
                             (NIB).

The following fields within the Network Information Block(NIB)
are of particular interest to the Generic 3A user on receipt of a
Status Update indication.

        network id - Network ID of the
             network solution supplying status update.

3.0 DESCRIPTION OF SERVICES/FEATURES
3.5.2 PROGRAM INTERFACE

> network status - updated status
> information. Allowable values are:
>
> > . net_up
> > . net_inactive
> > . net_congested
>
> max pdu size (field max_data_unit_size) - maximum allowed
> length of a data unit over this network solution.
>
> system id (field system_id) - System ID of receiving system.
>
> broadcast network indicator (field multicast) - boolean which
> indicates whether this is a broadcast network
> (broadcast/true, datagram/false).
>
> pointer to multicast/title record

PROCEDURE status_indication_3A (
    network_nib_pointer: ↑nib_type);

3.0 DESCRIPTION OF SERVICES/FEATURES
3.5.2 PROGRAM INTERFACE

3.6 ADDITION AND REMOVAL OF 3A HEADERS

Generic 3A provides for the addition and removal of 3A headers.
The contents of the header is determined by network solution
type. The allowable Intranet header types are HDLC, MCI and
Ethernet.
See the NEW DATA TYPES section of this ERS for a description
of these data types.

The Generic 3A header is added by the Generic 3A Data Request
routine. The appropriate header is selected according to the
network_type field specified in the Network Information
Block (NIB).

The Generic 3A header is removed when the SSR calls the
ssr_data_indication routine prior to calling the Generic 3A
user's data/broadcast indication procedure specified on the
open_3A_sap call.

3.0 DESCRIPTION OF SERVICES/FEATURES
3.7 DISCARDING DATA

3.7 DISCARDING DATA

All datagrams received from 3A users are queued in the LIB
associated with the particular network solution. This
queue is examined periodically and all datagrams queued
which are older than six seconds are released. In addition
the buffers utilized are also released. A log message
will be issued for each network solution in which one
or more datagrams are discarded.

4.0 PERFORMANCE

4.0 <u>PERFORMANCE</u>

The following performance parameters are established.

    Opening a 3A SAP   < 100 instructions

    Closing a 3A SAP   < 100 instructions

The following parameters are based on a DI system with
two network solutions and reflect the worst case in terms
of table lookups and loops (i.e. instruction counts are
based on loop conditions being met after two executions).

The number of instructions to move data units from
a SSR to a user of Intranet 3A - 300 instructions.

The number of instructions to move data units from
a user of Intranet 3A to a SSR - 300 instructions.

The memory requirement for the Intranet module will be less than 5k.

5.0 FINITE STATE MACHINE

5.0 <u>FINITE STATE MACHINE</u>

Generic 3A has no external protocol and therefore does
not need a FSM.

6.0 LOG MESSAGES

6.0 LOG MESSAGES

All software errors will be logged. These errors will be
described below.

L O G   M E S S A G E   P U R P O S E

Logs the sap number of the unknown sap

D E S C R I P T I V E   M E S S A G E

M A S K	L O G _ M E S S A G E _ B U F F E R		
fixed text	type	value	description
See mask1 below	NONE		Explained in mask1
The unknown sap number is	bin_int	1	The sap table number of the unknown sap

    mask1 = 'User tried to close an unknown sap or
             send data on an unknown sap'

L O G   M E S S A G E   ID

CONST
    intranet_unknown_sap   = min_log_message_id +97;

6.0 LOG MESSAGES

LOG MESSAGE PURPOSE

Logs the unknown protocol type

DESCRIPTIVE MESSAGE

MASK	LOG_MESSAGE_BUFFER		
fixed text	type	value	description
See mask1 below	NONE		Explained in mask1
The unknown protocol type is	bin_int	1	The protocol number of the unknown protocol

mask1 = 'SSR passed unknown protocol in data indication'

LOG MESSAGE ID

CONST
    intranet_unknown_protocol_type= min_log_message_id +98;

6.0 LOG MESSAGES

LOG MESSAGE PURPOSE

Logs the unknown network id

DESCRIPTIVE MESSAGE

MASK	LOG_MESSAGE_BUFFER		
fixed text	type	value	description
See mask1 below	NONE		Explained in mask1
The unknown net-work id is	bin_int	1	The network id of this un-known network

mask1 = 'Unknown network_id is passed by user in
          data request call'

LOG MESSAGE ID

```
CONST
     intranet_unknown_network_id    = min_log_message_id +99;
```

6.0 LOG MESSAGES

L O G   M E S S A G E   P U R P O S E

Logs the sap number of the already open sap

D E S C R I P T I V E   M E S S A G E

MASK	LOG_MESSAGE_BUFFER		
fixed text	type	value	description
See mask1 below	NONE		Explained in mask1
The sap number of this open sap	bin_int	1	The sap table number of the sap already open
The protocol type is	bin_int	1	The protocol number of this particular protocol

        mask1 = 'User tried to open a sap already open'

L O G   M E S S A G E   ID

CONST
        intranet_sap_already_open   = min_log_message_id +100;

6.0 LOG MESSAGES

L O G   M E S S A G E   P U R P O S E

Logs the sap number of the inactive sap

D E S C R I P T I V E   M E S S A G E

M A S K	L O G _ M E S S A G E _ B U F F E R		
fixed text	type	value	description
See mask1 below	NONE		Explained in mask1
The sap number of this inactive sap is	bin_int	1	the sap table number of this sap which is not active

mask1 = 'User tried to close an inactive sap or
       send data on an inactive sap'

L O G   M E S S A G E   I D

CONST
    intranet_sap_not_active   = min_log_message_id +101;

6.0 LOG MESSAGES

L O G   M E S S A G E   P U R P O S E

Logs information on datagrams released

D E S C R I P T I V E   M E S S A G E

MASK	LOG _ MESSAGE _ BUFFER		
fixed text	type	value	description
See mask1 below	NONE		Explained in mask1
Number of data-grams released	bin_int	1	The number of datagrams re-leased in all networks
The network id is	bin_int	1	The network id of this particular network

mask1 = 'Datagrams older than 6 seconds are released'

L O G   M E S S A G E   ID

```
CONST
      intranet_datagram_released     = min_log_message_id+102;
```

6.0 LOG MESSAGES

L O G   M E S S A G E   P U R P O S E

Logs the unknown link status

D E S C R I P T I V E   M E S S A G E

MASK	LOG_MESSAGE_BUFFER		
fixed text	type	value	description
See mask1 below	NONE		Explained in mask1
The unknown link status	bin_int	1	The link status type of this unknown link

mask1 = 'Unknown link status is received from SSR'

L O G   M E S S A G E   ID

```
CONST
    intranet_unknown_link_status  = min_log_message_id+103;
```

7.0 STATISTICS

7.0 STATISTICS

The following Statistics will be collected for each network solution.

Network name

Number of messages transmitted

Number of messages received

Number of messages received as broadcast

* Count in network congested state

* Count in network uncongested state

* Count in any other state

Number of transitions into the congested state

Number of messages discarded from the queues

* These counts are used to calculate percentage of
  time spent in each state

The following queue statistics will be collected

Sum of outgoing messages added to the queues for
all network solutions during the reporting period.

Sum of outgoing messages in queues for all network
solutions at the start of the reporting period.

Number of all incoming messages received from the SSRs
during the reporting period.

8.0 INSTALLATION OPTIONS

8.0 <u>INSTALLATION OPTIONS</u>

None.

9.0 NEW DATA TYPES

9.0 <u>NEW DATA TYPES</u>

Data types defined in above sections of this ERS are:

1) nib   Network Information Block(NIB)
2) lib   Link Information Block(LIB)
3) network_range_type   Network types
4) protocol_range_type   Protocol type codes
5) user_datagram_proc_type   NIB 3B Datagram Procedure
6) user_status_proc_type   NIB 3B Status Procedure
7) network_id_type   Network ID type
8) sap_id_type   Service Access Point type
9) 13A_status_type   Intranet status codes
10) hdr_3A_hdlc   Intranet header(HDLC)
11) hdr_3A_mci   Intranet header(MCI)
12) hdr_3A_esci   Intranet header(ESCI)

9.0 NEW DATA TYPES

```
NIB - Network Information Block.
 TYPE
  NIB_TYPE = RECORD
    next_nib:                    ↑nib_type,        { chain to next nib
    nib_with_common_lib:         ↑nib_type,        { chain to next nib which
                                                   { uses same lib

    network_type:                network_range_type,{ network solution type
    network_status:              network_status_type,{ network solution status
    network_id:                  network_id_type,  { network solution id
    network_name:                clt$name,         { network solution name
    network_cost:                0 .. 65535,       { network solution cost
    x25_pdn_id:                  x25_valid_pdns,   { specific x25 pdn type
    x25_init:                    boolean,          { x25 network initialized
    x25_net:                     boolean,          { network type X25
    relay_allowed:               boolean,          { network allows relay
    multicast_network:           boolean,          { multicast nw indication
    cdna_routing_info_nw:        boolean,          { routing info indication
    rotary:                      boolean,          { hdlc rotary indication
    cdna_xerox_broadcast_addr:   system_id_type,   { broadcast addr for nw.
    max_data_unit_size:          0 .. 65535,       { maximum data unit size
    intranet_header_size:        0 .. 65535,       { 3A header size
    local_dte :                  integer,          { local network routing addr
    remote_dte:                  integer,          { remote network routing addr
    congestion_threshold:        0..255,           { system becomes congested
    un_congestion_threshold:     0..255,           { system becomes uncongested
    lib_ptr:                     ↑13_lib_type      { chain to associated LIB
  RECEND;
```

9.0 NEW DATA TYPES

LIB - Link Information Block.

TYPE
  L3_LIB_TYPE = RECORD
    nib_ptr: ↑nib_type,   { pointer to owner nib
    output_qcb: qcb@,   { queue control block
    nxt_lib_ptr: ↑l3_lib_type,   { chain to next lib
    link_status: link_status_type,   { status of this link
    ssr_task_id: taskid,   { ssr task id
    ssr_tracing,   { diagnostic trace
    minimum_set_lib_address: ↑l3_lib_type   {set by 3A command processor
    lib_defined,   {set by 3A command processor
    trunk_to_replace_minimum_set,   {set by 3A command processor
    ssr_collecting_stats,   { collecting statistics
    ssr_sleeping: boolean,   { ssr needs wakeup call
    ssr_data_req_proc: ssr_data_req_proc_type, { get data
    ssr_data_ind_proc: ssr_data_ind_proc_type, { send data
    ssr_status_ind_proc: ssr_status_ind_proc_type, { send status
    link_type: owner_type,   { owner of LIB
    trunk_name: clt$name,   { name of LIB
    next_linked_lib: ↑l3_lib_type   {addr of next LIB in DI
    lib_defined: boolean,   {lib configured or booted
  RECEND;

CONTROL DATA PRIVATE

9.0 NEW DATA TYPES

Network Range Type.

```
TYPE
  network_range_type = (hdlc_network,esci_network,mci_network,
                        telenet_network,tymnet_network,datapac_network);


TYPE
  protocol_range_type = (diagnostic_3a_protocol_type ..
                         routing_me_3a_protocol_type),

  user_datagram_proc_type = ↑procedure (
    multicast: boolean; { broadcast/true, datagram/false
    receiving_network_id: network_id_type;
    originating_system_id: system_id_type;
    VAR data_ptr: buf_ptr),

  user_status_proc_type = ↑procedure (
    network_nib: ↑nib_type);

  network_id_type = integer,

  sap_id_type = 0 .. 0ffff(16),

  13A_status_type = (request_processed, sap_out_of_range,
                     sap_active, sap_not_active,
                     network_down, unknown_network);
```

9.0 NEW DATA TYPES

GENERIC 3A HEADER TYPES

```
TYPE
  13a_header_type = record
    case integer of
    = 1 =
    {HDLC INTRANET HEADER
      hdlc_3a: packed record
        dsap: protocol_range_type,
        ssap: protocol_range_type,
        control: 0 ..  0ff(16),
      recend,

    = 2 =
    {MCI INTRANET HEADER
      mci_3a: packed record
        destination_address: system_id_type,
        source_address: system_id_type,
        length: 0 ..  0ffff(16),
        dsap: protocol_range_type,
        ssap: protocol_range_type,
        control: 0 ..  0ff(16),
      recend,

    = 3 =
    {ESCI INTRANET HEADER
      esci_3a: packed record
        destination_address: destination_address_type,
        source_address: system_id_type,
        length: 0 ..  0ffff(16),
        dsap: protocol_range_type,
        ssap: protocol_range_type,
        control: 0 ..  0ff(16),
      recend,
    casend,
  recend;
```

9.0 NEW DATA TYPES

```
NETWORK STATUS TYPE
 TYPE
   network_status_type = (net_up,
                          net_inactive,
                          net_congested,
                          net_up_for_remote_load,
                          net_terminate);


 CONST
   routing_me_3a_protocol_type = 12,
   initialization_me_3a_protocol_type = 8,
   diagnostic_3a_protocol_type = 2,
   xerox_internet_protocol_type = 4;
```

APPENDIX A

FUTURE ENHANCEMENTS TO THE INTRANET ERS

     The following changes will be made to the Intranet ERS after R1.

   . The LIB will be defined as a variant record. A variant
      will be defined for each type of trunk as well as for
      each intended use of the same trunk. Some examples of
      these variants are CDCNET ethernet LIB, DOD ethernet
      LIB, CDCNET HDLC LIB, Tymnet HDLC LIB, C170 MCI LIB,
      C180 MCI LIB, etc.

   . The NIB will be defined as a variant record. A variant
      will be defined for each type of network solution which
      may be supported.

   . The Cybil definition of the network solution status will
      be re-worked to replace "net_up_for_remote_load" with
      "network_enabled" status.

   . Information will be added about the use of an X.25
      virtual circuit as a network solution.

   . Information will be added about the support of the HDLC
      rotary trunks.

   . Information will be added about the support provided for
      non-standard 3A headers as well as communication with
      non-CDNA systems.