Internet Engineering Task Force

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DPNSS/DASS 2 extensions to the IUA protocol
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Abstract

This document defines a mechanism for backhauling of DPNSS/DASS2 messages over IP by extending the ISDN User Adaptation Layer Protocol reference RFC3057. This document aims to become an Appendix to IUA and to be the base for a DUA implementation.

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1.0 Introduction

This document describes a method of implementing DPNSS/DASS 2 back-haul messaging over IP using a modified version of the ISDN User Adaptation Protocol (IUAP). The DUA builds on top of IUA defining the necessary extensions to IUA for a DPNSS/DASS2 implementation.

1.1 Scope

There is a need for Switched Circuit Network (SCN) signaling protocol delivery from a DPNSS Signaling Gateway (SG) to a Media Gateway Controller (MGC). The delivery mechanism should support the following protocols:

- DPNSS(Digital Private Network Signaling System)
- DASS 2 (Digital Access Signaling System No 2)

Unless specifically mentioned the details in this document are applicable to both DPNSS and DASS2.

1.2 Terminology

Data channel (D-channel) - A 64 kbit/s time slot which functions as a common signaling channel on a 2048 kbits/s interface or a 1544 kbits/s interface which is provisioned to carry DPNSS

signaling.

DPNSS channel - Time slots 1 to 15 and 17 to 31 on a 2048 kbits/s interface or Time slots 1 to 23 on a 1544 kbits/s interface are termed as DPNSS channels. These are the traffic channels which carry voice or data traffic.

- DPNSS supports 60 Channels (30 Real and 30 Virtual)
- DASS2 supports 30 Channels (All Real)

Data Link Connection(DLC) - A DLC is the level 2 process that controls the transfer of level 3 messages on behalf of one DPNSS channel. A DLC uniquely identifies one DPNSS channel.

- DPNSS supports 60 DLCs (30 Real and 30 Virtual)
- DASSII supports 30 DLCs (All Real)

DPNSS Link - A logical collection of the D-channel and the associated DPNSS channels in a 2048 kbits/s interface or a 1544 kbits/s interface is called a "DPNSS Link".

1.3 DPNSS Overview

DPNSS is an industry standard interface (reference BTNR 188) defined between a PBX and an Access Network (AN). DPNSS extends facilities normally only available between extensions on a single PBX to all extensions on PBXs that are connected together in a private network. DPNSS was originally derived from BT's Digital Access Signaling System I (DASS I) enhanced where necessary to meet the private network requirements. Some of these enhancements were incorporated in DASS 2. DPNSS uses a 2048 kbits/s or 1544 kbits/s Digital Transmission System Interface as shown in figure 1 below.

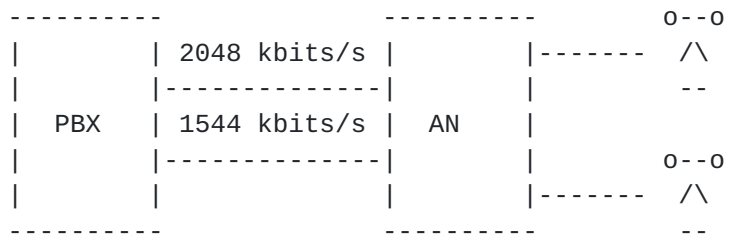
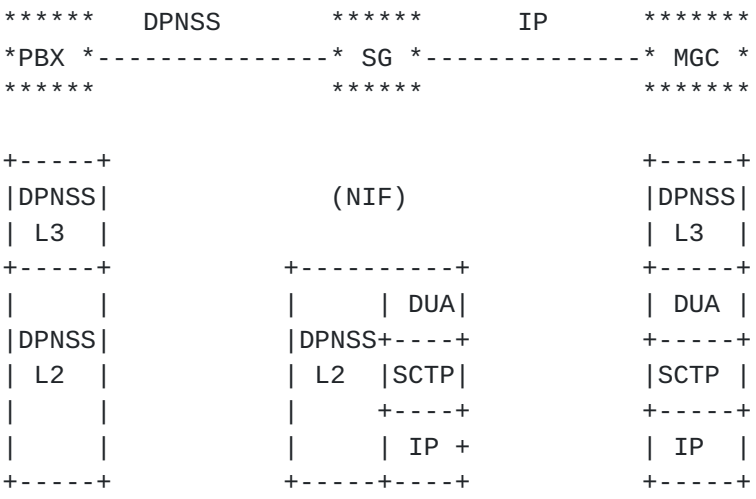


Figure 1

Channel 16 on a 2048 kbits/s interface and channel 24 on a 1544 kbits/s interface is reserved for data communication between LE and AN. The channels reserved for data are called "Data Channels" or "D-Channels."

The D-Channels are the physical media to exchange data between the DPNSS protocol peer entities. A logical collection of the D-channel and the associated DPNSS channels is called a "DPNSS Link".

1.4 Proposed DPNSS Backhaul Architecture



NIF - Nodal Interworking function
SCTP - Stream Control Transmission Protocol
DUA - DPNSS User Adaptation Layer Protocol

2.0 Changes from IUA

The following section outlines the differences between DUA and IUA

2.1 Message Header

IUA Message header has the format as shown in Figure 2 below.

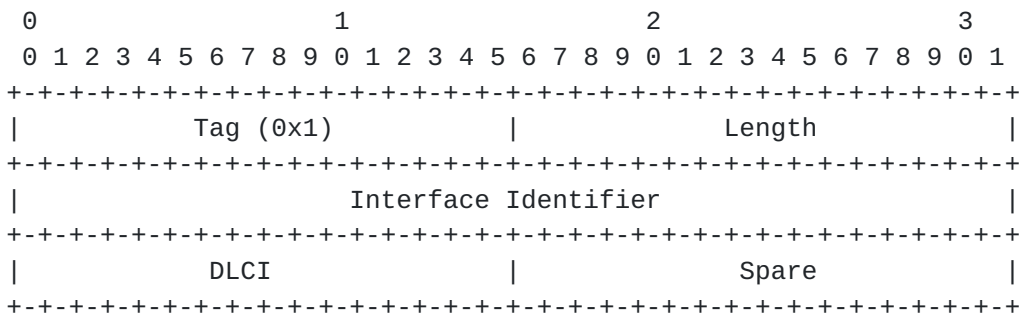
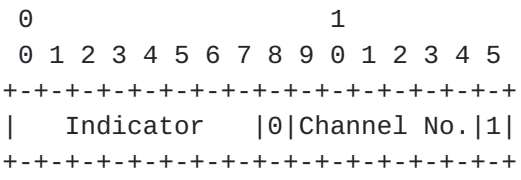


Figure 2 IUA Message Header

In DUA header DLCI field has a different format in accordance with the BTNR 188.



The indicator field is used to determine whether the message is for a particular DLC or it is applicable for all the DLCs in the carrier. The possible values of the indicator is mentioned below.

Value	Description
0	Action is to be performed on all DLCs Channel number parameter is ignored.
1	Action is to be performed on a single DLC specified by channel number.

This indicator value is used only by the Establish and Release messages. Data messages should ignore this value. This indicator is provided so that a single command can be issued to establish or release all the DLCs in one DPNSS Link.

For channel number the valid values are 0 to 63 for DPNSS and 0 to 31 for DASS 2. This is because DASS 2 does not support virtual DLCs and hence has only 32 DLCs.

2.2 Unit Data Message

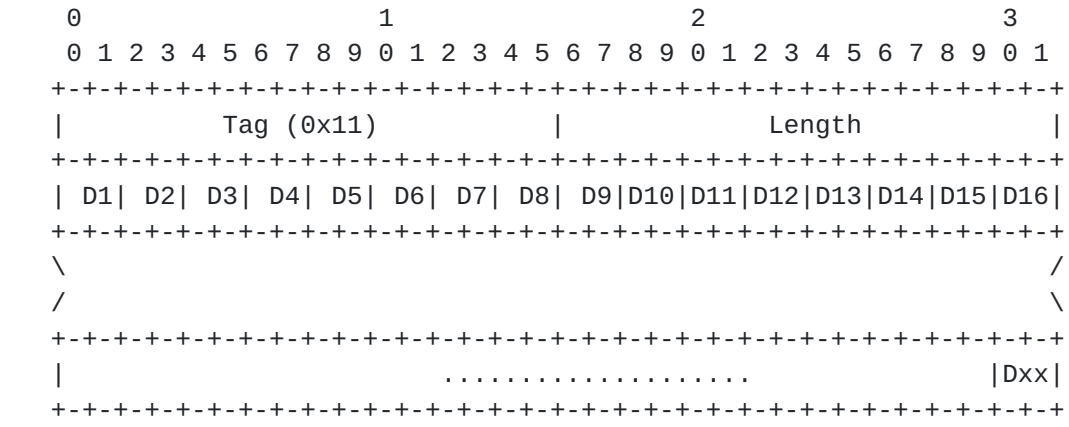
DPNSS layer 2 does not have a unit data primitive and hence the Unit Data Messages (Request, Indication) are invalid for a DUA application.

2.3 DLC Status Message

For DUA, a new message is necessary to carry the status of the DLCs. This message will be a Management message (i.e. its message class

will be a value of 0 for Management). A message type of 0x5 will be used for this message.

The DLC Status messages are exchanged between IUA layer peers to request, confirm and indicate the status of the DLCs. The DLC Status messages contain the common message header followed by IUA message header as described in section 2.1.



The parameter carries the status of DLCs using two bits for each DLC.

The possible values for the two bits are shown below:

Value	Description
00	Out Of Service
01	Reset Attempted
10	Reset Completed
11	Information Transfer

For DASS 2 the value 00 (Out Of Service) is invalid since the DASS 2 DLC does not have this state.

For DASS 2 there are no virtual DLCs and hence information about only 32 DLCs need to be carried. Therefore the status message will have a length of 12 for a DASS 2 DLC Status message.

2.4 Error Message

The ERR message is sent when an invalid value or unrecognized message is found in an incoming message.

The Error Code parameter indicates the reason for the Error Message. These are the supported values in IUA.

Invalid Version	0x01
Invalid Interface Identifier	0x02
Unsupported Message Class	0x03
Unsupported Message Type	0x04
Unsupported Traffic Handling Mode	0x05
Unexpected Message	0x06
Protocol Error	0x07
Unsupported Interface Identifier Type	0x08
Invalid Stream Identifier	0x09
Unassigned TEI	0x0a
Unrecognized SAPI	0x0b
Invalid TEI, SAPI combination	0x0c

In DUA the error codes 0x0a to 0x0c are invalid as they are specific to ISDN.

The following additional error codes are supported in DUA.

Channel Number out of range	0x0d
Channel Not configured	0x0e

3.0 IANA Considerations

A request will be made to IANA to assign a DUA value for the Payload Protocol Identifier in SCTP Payload Data chunk. The following SCTP Payload Protocol Identifier will be registered:

The SCTP Payload Protocol Identifier is included in each SCTP Data

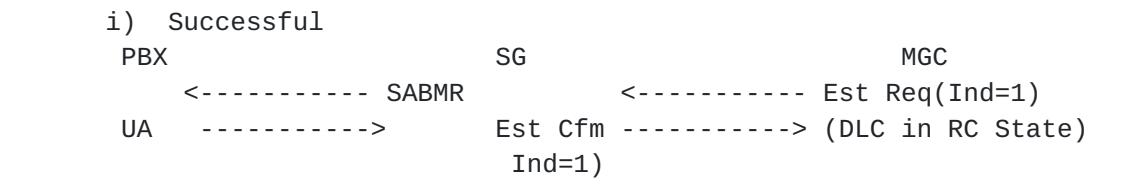
chunk, to indicate which protocol the SCTP is carrying. This Payload Protocol Identifier is not directly used by SCTP but may be used by certain network entities to identify the type of information being carried in a Data chunk.

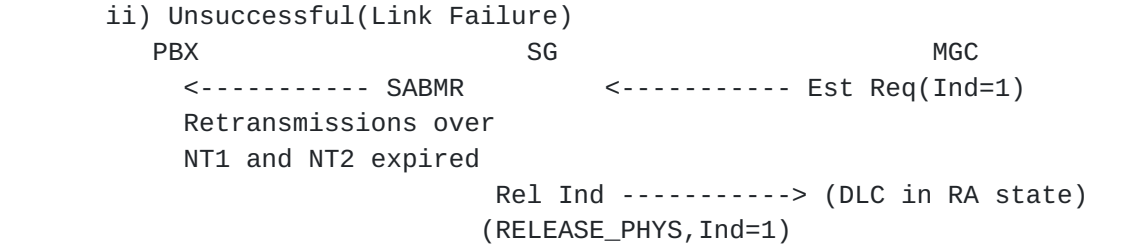
The User Adaptation peer may use the Payload Protocol Identifier as a way of determining whether the message is for IUA or DUA.

4.0 Message Sequence in DUA

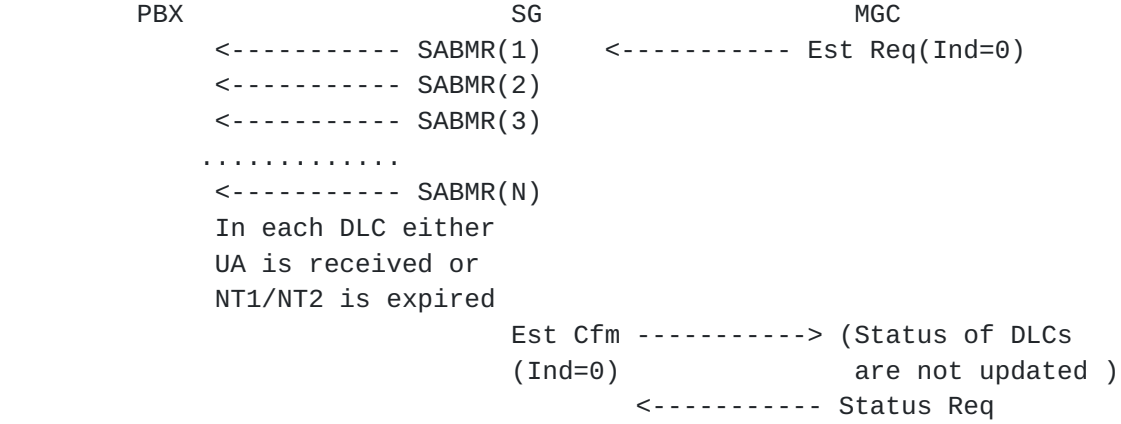
An example of the message flows for establishing a data link on a signaling channel, passing PDUs and releasing a data link on a DPNSS channel is shown below. An active association between MGC and SG is established prior to the following message flows.

4.1 Resetting of single DLC





4.2 Resetting all DLCs in a link



```
                          Status cfm ---------> (Mark DLC status
                                                 based on
                                                 status bits)
```

4.3 Information Transfer on a DLC

```
          PBX                    SG                       MGC
               <----------- UI(C)           <----------- Data Req
          UI(C)----------->         Data Ind ----------->
```

4.4 Link Takedown(Single DLC)

```
          PBX                    SG                       MGC
              (For DPNSS, mark DLC as OOS)   <----------- Rel Req
              (For DASSII, mark DLC as RA)              (RELEASE_MGMT,
                                                          Ind=1)
                                Rel Cfm  ---------->
                                (Ind=1)
```


4.5 Link Takedown(All DLCs)

```
          PBX                    SG                       MGC
              (For DPNSS, mark all DLCs as OOS) <-------- Rel Req
              (For DASSII, mark DLC as RA)              (RELEASE_MGMT,
                                                          Ind=0)
                                   Rel Cfm  ---------->
                                   (Ind=0)
```

4.6 Getting link Status

```
          PBX                    SG                       MGC
                                        <-----------  Stat Req
                                Stat Res ----------> (Mark DLC status
                                                      based on
                                                      status bits)
```

4.7 Error conditions

```
          PBX                    SG                       MGC
                              Invalid Message <-----------
```

```
      Est/Rel/Data/Stat Req
                                 Error Ind   ----------->
                                (Error Code)
```

5.0 Glossary of terms

```
          Real channel   : The signalling channel with associated
                           traffic channel (TS).
          Virtual channel: The signalling channel with no
                           associated traffic channel.
          NT1            : Retransmission period of 500msec.
          NT2            : Recommended value is 64.
```

6.0 References

[1] Morneault, et al., "ISDN Q.921-User Adaptation Layer", RFC 3057, February 2001.

[2] BTNR (British Telecom Network Requirements) 188 Issue 6 Digital Private Network Signaling System 1.

[3] BTNR (British Telecom Network Requirements) 190 Issue 2 Digital Access Signaling System No 2

[4] ETS 300 167 (08/1993) : Transmission and Multiplexing; Functional characteristic of 2048 kbits/s interfaces (Standard is based on G.704, G.706).

7.0. Acknowledgments

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8.0 Author's Addresses

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