Segmentation and Reassembly

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1 Introduction

The purpose of this document is to describe segmentation and reassembly protocols used on the various MSDL networks. It is our eventual intention to move over to using fully standard compliant headers and adaptation layers. There is however a large body of deployed hardware and software in the Computer Laboratory which pre-dates standardisation attempts. This document describes their formats, and details how they currently inter-operate with standard protocols.

Note should be taken that throughout this document octet numbering is with reference to the FAS fields. For information on the positioning of the FAS fields within a cell or block please consult the EDL, MDL or FDL documentation as appropriate.

2 Framing and Sequencing

The FAS, otherwise known as user control information has two purposes. One purpose is to indicate framing information to allow for optimisations at a lower level for example when blocking cells together or when interrupting a host. There are two bits of this framing information. Bit 7 of the second octet is defined to be set on the first cell of a block. Bit 6 of the second octet is defined to be set on the last cell of a block. These two bits are denoted “fs” and “fe” respectively in table 1. The other six bits in the second octet and all of the first octet are available for use as sequencing information.

Octet	7	6	5	4	3	2	1	0
0	FAS							
1	fs	fe	FAS					

Table 1: FAS

3 SAR1

The original SAR1 is shown in table 2, where “st” was set on the first cell of a block and “pf” indicates that the cell was partly full, which only happened on the last cell of a block.

This was the UDL SAR which had been previously used on Unison. The cell sequence number counted down from a maximum value in the first cell of a block, to 1 in the last cell. Thus the sequence number in the first cell of a block was the expected cell count, and indicated the block size.

Octet	7	6	5	4	3	2	1	0	Description
0	sequence								Number of cells remaining.
1	st	pf	assemble						Flags, increasing counter

Table 2: SAR1

The assemble field started at zero when a circuit was opened and was incremented (modulo 64) after each block is transmitted.

Unfortunately this was not compatible with FAS.

3.1 EDL

EDL networks use a variant of SAR1 where the part-full bit should never be set. EDL does not impinge on the standard protocols.

Note also that on EDL networks the two octets of the SAR are sent in reverse order. This is for the historical reason that the network does not have hardware imposed endian swap on the header.

4 SAR1a

SAR1a is an instance of MSSAR which is as similar to SAR1 as possible but which is compliant with FAS. It is shown in table 3.

Octet	7	6	5	4	3	2	1	0	Description
0	sequence								Number of cells remaining.
1	fs	fe	assemble						Framing, increasing counter

Table 3: SAR1a

4.1 FDL Standards Issues

FDL networks used SAR1a. However such networks may also carry cells from standard compliant equipment. In order to inter-operate the assumption is made that the network is performing VPI switching so that the SAR1a information will be carried by the network between FDL/MSSAR endpoints. This only leaves the problem of the PT code-points. To avoid using embarrassing code point values, FDL networks shall always step the assemble field in such a way that no PT code-point with the most significant two bits set shall ever be emitted.

Octet	7	6	5	4	3	2	1	0	Description
1	fs	fe	assemble						Framing, increasing counter
1					PT				PT Shall not have the value $11x_2$

Table 4: Overlap of assemble and PT