

# Memory Tracking System for PFA version 2.2.1

## 1. Introduction

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This is a system to help identify problems in the event of low memory conditions or an out-of-memory restart. This could be caused by either:

- a. an in-appropriately dimensioned box eg. bursty traffic with large packets.
- b. an engineering problem within the box.

If memory tracking is initiated on a box then certain information is preserved that can be inspected using the UILOP command, even after box restart.

The information may then be useful to identify the cause of the problem.

NB. PFA Memory Tracking should normally be used under supervision from Intracom or Global Support Centre.

PFA Memory Tracking will cause a small reduction in the switching performance of the PFA.

## Terms

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malloc	- the allocation of RAM in PFA
free	- the freeing of RAM in PFA
channels	- the inter-process communication system with PFA
ECB	- the PFA's internal buffer carrier - referred to in NALOP as QUE.

## Simple Use

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The simplest use of PFA Memory Tracking is, where memory is low, to identify where it is being used. For instance if a large X.25 window size is used, a lot of memory may be queued in the X.25 level 3 tasks. This can be checked from the Memory Allocation Summary (in 1. below).

The tasks of most interest in data switching are as follows:

Task id	Description
ROOT	the system root task
UAnn UXnn	User interface tasks "
PNAD IE00 SNMP	IP central switch (pNA) Ether driver SNMP
IW00 NPxx LPxx	X.25/X.75 central switch (IWU) X.25/X.75 level 3 X.25/X.75 level 2
LMIO FLxx FNxx	Frame relay status handling Frame relay tasks ""
PPxx XX00 MT00 AH00 TPnn EP00	WAN Physical port X.29 session port MTP session port MTP (NM400) alarm handler X.25/X.75 traffic port X.25/X.75 echo port

Where xx identifies the port eg. PP06 is physical port #6.  
Where nn is an integer.

## Features

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### 1. Memory Allocation Summary

```
UIDBS:NAME=MALLOC_TRACKING,VALUE=S;
```

UILOP will display the current Memory Allocation Summary until an out-of-memory or out-of-ECBs restart; after which it displays the Memory Allocation Summary from just prior to the last out-of-memory restart. The box has to be powered off to return to current Memory Allocation Summary.

The information presented is:

- values from NALOP for memory and ECB usage.
- a summary of memory allocations by task.

For example:

```
Memory Allocation Summary
```

```
Memory: free= 2831084 min= 2830540 max=3467884
```

```

ECBs   : free=    9198  min=    9188  max=    9310

ECB size = 68

ROOT allocs =    7 total = 674432

PNAD allocs =    1 total =  1664

SNMP allocs =    5 total = 14464

UXOR allocs =    2 total =   672

IW00 allocs =   32 total =  6176

LMI0 allocs =   12 total =  1440

MT00 allocs =   52 total =  1888

XX00 allocs =   54 total =  2080

AH00 allocs =    8 total =  1216

EP00 allocs =    1 total =    96

TP00 allocs =    1 total =    96

```

## 2. Print Current Memory use analysis

```
UIDBS:NAME=MALLOC_TRACKING,VALUE=P;
```

UILOP will display all of the information in 1. above, followed by a further table containing the following information on all current mallocs:

```

taskID
calling address of the malloc
the time in minutes after restart

```

The task name is updated as the block passes through channels etc. to another tasks ownership. It is wise to set UIMOD; when using this option, as the UILOP display can be very long. <CTRL>C can be used at the more prompt.

For example:

```

Current Memory use analysis

TASK  ADDRESS  SIZE  TIME  SLOT  ADDR

IW00  3371A    32    0    4AF308

UA02  A3344    32   19    4AF328

IW00  5A748    64    0    4AF388

LMI0  67B5C    64    0    4AF408

```

LMI0	9C3F0	64	0	4AF448
NP04	51F70	64	0	4AF608
NP01	51F70	64	0	4AF688
LMI0	5F8AE	64	0	4AF6C8
LMI0	5FA42	64	0	4AF708
AH00	9C3F0	64	0	4AF748
NP06	51F70	64	1	4AFA48
LP06	44118	64	0	4AFB08

### 3. No duplicates - Current Memory use analysis

```
UIDBS:NAME=MALLOC_TRACKING,VALUE=PN;
```

This will cause mallocs of the same size, and from the same calling address to be merged in the display (described in 2. above) giving an instance count in braces, thereby shortening the prinout.

For example:

```
Current Memory use analysis

TASK  ADDRESS  SIZE  TIME  SLOT  ADDR
-----
ROOT  9D2D4 598624  0    41B9A8
IW00  44118   64    0    4ADC08 (2)
NP01  44118   64    0    4ADC48 (2)
UA00  E1242   32    0    4ADC88 (9)
UA00  E1436   64    0    4ADCC8 (10)
UA00  1110B6  64    0    4ADD48 (10)
MT00  1216E6  32    0    4ADE48 (48)
XX00  1216E6  32    0    4AE448 (48)
IE00  44118   64    0    4AEA48
```

### 4. Pre-set memory

```
UIDBS:NAME=PRESET_MALLOCS,VALUE=P;
```

This will cause all malloced data areas to be preset to DDDDDDDDDDD which may cause crashes earlier when reading uninitialised memory. This is for use under direction from Intracom only.