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SOURCE: Compaq Computer Corporation INFORMATION BLITZ

NOTE: This Blitz supersedes TD 2370 dated 05-NOV-1997.

INFORMATION BLITZ TITLE:

OpenVMS Alpha V7.1 with > 1G Memory Needs NPORT BAP

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PRODUCT NAME(S) IMPACTED: OpenVMS Alpha V7.1 Systems with > 1G
of Memory

PRODUCT FAMILY(IES):

PRODUCT NUMBERS:

Storage _____
Systems _____
Networks _____
PC _____
Software X
Other (specify) _____

PROBLEM STATEMENT:

=====

The NPORT (CIPCA,CIXCD,KFMSB) Bus Addressable Pool (BAP) will not correctly initialize on OpenVMS ALPHA V7.1 systems with greater than 1 Gigabyte of memory if NPAG_BAP_xxx SYSGEN parameters are not correctly setup.

This will occur after an installation or upgrade to OpenVMS ALPHA V7.1 if AUTOGEN with FEEDBACK is *NOT* run after completing the upgrade/installation:

VMS-6.2-1H3 -> VMS-7.1 upgrade

or
VMS-7.1 installation

AUTOGEN/FEEDBACK will ****NOT**** run automatically during the installation or upgrade. Only AUTOGEN/CHECK_FEEDBACK is automatically run to capture "feedback" from the previous upgrade/installation.

This problem will also occur if a V7.1 system has additional memory installed that puts the total memory over 1 gig.

SYMPTOM:
=====

This system may run without problems until loaded enough to exhaust the minimum BAP Pool. At this point there will be performance problems including possible system and cluster hangs.

The following error may occur without a correctly sized BAP pool when > 1 GB of memory is present:

```
%PNx0, Insufficient Non-paged Pool for Initialization.  
  where PN = CIPCA, CIXCD, or KFMSB;  
         x = A,B,C,etc.: 1st,2nd,3rd NPORT adapter
```

WORKAROUND:
=====

After an OpenVMS upgrade to V7.1 an AUTOGEN/FEEDBACK should be run. If it this is not possible, ensure that the BAP SYSGEN parameters are correctly set up and that the BAP pool is sufficiently sized.

OpenVMS Engineering recommends the following steps to determine the parameter settings:

1.1) Use the following formula to calculate BAP SYSGEN PARAMETERS:

```
NPAG_BAP_MIN = Total of SCS and per-port NPORT "minimum"  
               requirements:  
               - SCS: 40960 bytes  
               - NPORT: (262144)*(# OF NPORT devices)  
                       (NPORT device = CIPCA, CIXCD, KFMSB)  
                       NPORT device count:  
                           CIPCA=1  
                           CIXCD=1  
                           KFMSB=2
```

EXAMPLE: a system that has 1-CIPCA,1-CIXCD,1-KFMSB
the # OF NPORT devices would = 4

```
NPAG_BAP_MAX = Total of SCS and per-port NPORT "maximum"  
               requirements
```

```

- SCS: 131072 bytes
- NPORT: (4194304)*(# OF NPORT devices)
          (NPORT device = CIPCA, CIXCD, KFMSB)
          NPORT device count:
              CIPCA=1
              CIXCD=1
              KFMSB=2

```

NPAG_BAP_MAX_PA = High memory-physical-address limit of
PCI Direct-DMA window: 1073741824

```

EXAMPLE:                TYPICAL VALUE w/2 CIPCAS
                        =====
NPAG_BAP_MIN            565248          Bytes
NPAG_BAP_MAX            8519680        Bytes
NPAG_BAP_MAX_PA        1073741824     PhysAddr

```

1.2) Update MODPARAMS.DAT with this information. This will ensure that when AUTOGEN is run during the upgrade procedure, these values will be used to size the BAP pool.

****NOTE**** If these steps are not followed or an AUTOGEN/FEEDBACK is not performed, OpenVMS will allocate a "survival" amount of BAP pool.

This amount will generally allow the system to boot but is not intended to allow normal system production. If these actions are not followed the system more than likely will experience one of the previously mentioned symptoms.

VERIFICATION:
=====

To confirm if BAP pool has been inited, the following commands can be used . This applies for ALPHA VMS-7.1 systems with > 1GB memory

Example of system with BAP that has ****NOT**** been inited

\$ sh mem/pool/full

System Memory Resources on 21-OCT-1997 14:18:06.77

```

Nonpaged Dynamic Memory      (Lists + Variable)
Current Size (bytes)         5709824      Current Size (pagelets)      11152
Initial Size                 5709824      Initial Size (pagelets)      11152
Maximum Size                 28549120     Maximum Size (pagelets)      55760
Free Space (bytes)           2721792      Space in Use (bytes)         2988032
Largest Variable Block       2289664      Smallest Variable Block      64
Number of Free Blocks         1283         Free Blocks LEQU 64 Bytes    31
Free Blocks on Lookasides     713         Lookaside Space (bytes)      198848

```

(Minimum Bus Addressable Memory allocated from Nonpaged Dynamic--run Autogen)

```

Bus Addressable Memory          (Lists + Variable)
Current Size (bytes)            565248      Current Size (pagelets)      1104
Initial Size                    0        Initial Size (pagelets)      0
Free Space (bytes)              215296      Space in Use (bytes)        349952
Largest Variable Block          95744      Smallest Variable Block      64
Number of Free Blocks            514        Free Blocks LEQU 64 Bytes    76
Free Blocks on Lookasides       273        Lookaside Space (bytes)     73088

```

```

Paged Dynamic Memory
Current Size (PAGEDYN)          7544832    Current Size (pagelets)     14736
Free Space (bytes)              4777456    Space in Use (bytes)        2767376
Largest Variable Block          4776464    Smallest Variable Block      16
Number of Free Blocks            30         Free Blocks LEQU 64 Bytes    28

```

SYSGEN> SHOW NPAG_BAP

| Parameter Name | Current | Default | Min. | Max. | Unit |
|-----------------|---------|---------|------|------|----------|
| Dynamic | | | | | |
| NPAG_BAP_MIN | 0 | 0 | 0 | -1 | Bytes |
| NPAG_BAP_MAX | 0 | 0 | 0 | -1 | Bytes |
| NPAG_BAP_MAX_PA | -1 | -1 | 0 | -1 | PhysAddr |

SDA> show pool/sum/bap

Bus-Addressable Dynamic Storage Pool

```

-----
Start                End                Length
-----
FFFFFFFF.8086C680    FFFFFFFFF.808AC680  00000000.00040000
FFFFFFFF.808AD200    FFFFFFFFF.808B7200  00000000.0000A000
FFFFFFFF.808C84C0    FFFFFFFFF.809084C0  00000000.00040000

```

```

Free list header:          FFFFFFFFF.82387440
Lookaside list header array: FFFFFFFFF.823A71F8

```

Summary of Bus-Addressable Pool contents

```

-----
  2 UNKNOWN = 5632 (1%)
162 CIDG   = 142848 (40%)
291 CIMSG  = 93120 (26%)
129 DEA    = 16384 (4%)
479 CI     = 91968 (26%)

```

Total space used = 349952 out of 565248 total bytes, 215296 bytes left

NOTE

This system has the "survival amount" of BAP allocated.

Example of system with BAP that **HAS** been inited

\$ show mem/pool/full

System Memory Resources on 21-OCT-1997 15:27:02.08

Nonpaged Dynamic Memory (Lists + Variable)

| | | | |
|---------------------------|----------|---------------------------|---------|
| Current Size (bytes) | 5709824 | Current Size (pagelets) | 11152 |
| Initial Size | 5709824 | Initial Size (pagelets) | 11152 |
| Maximum Size | 28549120 | Maximum Size (pagelets) | 55760 |
| Free Space (bytes) | 3376576 | Space in Use (bytes) | 2333248 |
| Largest Variable Block | 3002176 | Smallest Variable Block | 64 |
| Number of Free Blocks | 1107 | Free Blocks LEQU 64 Bytes | 3 |
| Free Blocks on Lookasides | 1075 | Lookaside Space (bytes) | 343488 |

Bus Addressable Memory (Lists + Variable)

| | | | |
|---------------------------|---------|---------------------------|--------|
| Current Size (bytes) | 8519680 | Current Size (pagelets) | 16640 |
| Initial Size | 8519680 | Initial Size (pagelets) | 16640 |
| Free Space (bytes) | 8168640 | Space in Use (bytes) | 351040 |
| Largest Variable Block | 8130112 | Smallest Variable Block | 64 |
| Number of Free Blocks | 161 | Free Blocks LEQU 64 Bytes | 19 |
| Free Blocks on Lookasides | 115 | Lookaside Space (bytes) | 33216 |

Paged Dynamic Memory

| | | | |
|------------------------|---------|---------------------------|---------|
| Current Size (PAGEDYN) | 7544832 | Current Size (pagelets) | 14736 |
| Free Space (bytes) | 4778416 | Space in Use (bytes) | 2766416 |
| Largest Variable Block | 4777440 | Smallest Variable Block | 16 |
| Number of Free Blocks | 26 | Free Blocks LEQU 64 Bytes | 23 |

SYSGEN> SHOW NPAG_B

| Parameter Name | Current | Default | Min. | Max. | Unit |
|-----------------|------------|---------|------|------|----------|
| Dynamic | | | | | |
| NPAG_BAP_MIN | 565248 | 0 | 0 | -1 | Bytes |
| NPAG_BAP_MAX | 8519680 | 0 | 0 | -1 | Bytes |
| NPAG_BAP_MAX_PA | 1073741824 | -1 | 0 | -1 | PhysAddr |

SDA> show pool/bap/sum

Bus-Addressable Dynamic Storage Pool

| Start | End | Length |
|-------------------|-------------------|-------------------|
| FFFFFFFF.8080A000 | FFFFFFFF.8102A000 | 00000000.00820000 |

Free list header: FFFFFFFF.82B87440
Lookaside list header array: FFFFFFFF.82BA71F8

Summary of Bus-Addressable Pool contents

| | | | | |
|-----|---------|---|--------|-------|
| 2 | UNKNOWN | = | 5632 | (1%) |
| 163 | CIDG | = | 143744 | (40%) |
| 292 | CIMSG | = | 93440 | (26%) |
| 129 | DEA | = | 16384 | (4%) |
| 481 | CI | = | 92352 | (26%) |

Total space used = 351552 out of 8519680 total bytes, 8168128 bytes left

Total space utilization = 4%

FULL ANALYSIS:

=====

NPORT adapter data-structures require a special, separate BAP ("Bus Addressable Pool") on system with > 1 Gb. of memory. Nominal BAP sizing requires its initialization at SYSBOOT time, which occurs if NPAG_BAP_xxxx SYSGEN parameters include the "accumulated MIN/MAX" BAP requirements of all of the NPORT adapters on the system. If BAP initialization is deferred until the NPORT driver-init registers for BAP, only the "survival/MIN" BAP amounts will be allocated: which may be inadequate for normal system-load, and result in the above symptoms.

BAP pool is merged with NPAGEDYN on systems with < 1 Gb. of memory: individual device BAP MIN/MAX requirements (registered in NPAG_BAP_MIN and NPAG_BAP_MAX) are added to NPAGEDYN and NPAGEVIR respectively when NPAGEDYN is initialized.

NOTE: BAP pool provides memory on VMS-7.1 systems, with sufficiently low physical-addresses to guarantee CIPCA-accessability via the PCI-bus direct-DMA bus-address space. Systems with > 1 Gb. of memory require a BAP pool to ensure all NPORT data-structures are accessible by the Nport adapter.

Under VMS-7.1, BAP (bus-addressable-pool) replaces DDMA-pool. which was used in VMS-6.2-1H3.

```
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