Troubleshoot BGP Virtual Memory (RLIMIT) Issue on IOS XR

Contents

Introduction

This document describes the BGP virtual memory (RLIMIT) issue on Cisco routers and outlines steps to take when encountering this issue.

Background Information

Rlimit defines the Resource Limit for a process in XR and varies depending on each process memory requirements. These limits can differ between releases as they can be adjusted based on new needs and discoveries.Rlimit is determined by fixed memory allocations for components such as shared memory, kernel, and dllmgr, making it non-configurable through CLI.

Issue Summary

Memory usage spiked to 90% after the BGP peer connection was established. This could also cause the BGP process to crash.

```
RP/0/RSP0/CPU0:Jul 15 01:04:24.815 GMT: bgp[1087]: %HA-HA_WD_LIB-4-RLIMIT :wd_handle_sigxfsz: Reached 9(
RP/0/RSP0/CPU0:Jul 15 01:04:24.815 GMT: bgp[1087]: %ROUTING-BGP-4-VIRTUAL_MEMORY_LIMIT_THRESHOLD_REACHE
```

This command shows the maximum amount of memory that any process can access.

```
RP/0/RSP0/CPU0:ASR#show bgp process performance-statistics | i RLIMIT
Platform RLIMIT max: 2281701376 bytes
```

This command shows the dynamic limit in the heap:

```
RP/0/RSP0/CPU0:ASR#show bgp instance all scale
BGP instance 0: 'default'
========================
```

```
VRF: default
Neighbors Configured: 2      Established: 2
Address-Family   Prefixes Paths    PathElem   Prefix     Path       PathElem
                                              Memory     Memory     Memory
  IPv4 Unicast   112649   225065   112649     9.88MB     13.74MB    6.77MB
  IPv6 Unicast   6358     12581    6358       645.73KB   786.31KB   391.17KB
------------------------------------------------------------------------
  Total          119007   237646   119007     10.51MB    14.50MB    7.15MB
node:      node0_RSP0_CPU0
----------------------------------------------------------------
JID    Text       Data       Stack      Dynamic    Dyn-Limit  Shm-Tot    Phy-Tot    Process
------ ---------- ---------- ---------- ---------- ---------- ---------- ---------- -------
1067          1M        10M       572K      2001M      2175M       145M      2012M  bgp            <<<<<
343           8K        12K       128K       421M      1024M        30M       422M  mibd_infra
1141         22M         5M      1012K       374M      2048M        95M       380M  netconf
Total text: 22893 pages
      data: 24102 pages
     stack: 6765 pages
  malloced: 21257 pages
```

Limitation

The RLIMIT restriction is a critical factor on cXR 32-bit systems, where a memory ceiling is enforced. This limitation directly impacts the memory available for BGP processes.

However, on eXR 64-bit systems, the RLIMIT is significantly increased. This enhancement multiplies the available memory for BGP processes, providing a more robust environment for handling larger routing tables and more peers.

Please find the comparison of Memory Allocation:

Device with RSP880-LT-TR and eXR has the RLIMIT for BGP as 7.4GB

```
RP/0/RSP0/CPU0:ASR#show processes memory detail 10523
JID        Text        Data        Stack       Dynamic     Dyn-Limit   Shm-Tot     Phy-Tot    Process
======================================================================================================
1087        2M         1030M       136K        41M         7447M       131M        183M       bgp
```

Device having RSP880-LT-TR and cXR has the RLIMIT for BGP as 2.5GB

```
RP/0/RSP0/CPU0:ASR#show processes memory detail 1087
JID    Text       Data       Stack      Dynamic    Dyn-Limit  Shm-Tot    Phy-Tot    Process
------ ---------- ---------- ---------- ---------- ---------- ---------- ---------- -------
1087    1M         10M        356K       31M        2574M      35M        41M        bgp
```

Possible Workaround/Solution

To address the memory issue with BGP, these steps can be considered.

- Upgrade to 64-bit System

    - BGP benefits from a larger memory allocation on a 64-bit system, approximately 8GB as defined by RLIMIT. This upgrade can help manage the increased memory demands of BGP.

- Change ASR9k Profile

    - Switch the ASR9k profile from the default setting to the L3XL profile. This adjustment increases the memory allocation for BGP, which can help alleviate memory pressure.

    - Note that changing to the L3XL profile reduces the memory available for other processes. Therefore, it is essential to evaluate the impact on the overall system performance.

    - Before implementing the L3XL profile, thoroughly review the platform documentation to understand its implications and ensure compatibility with your system requirements.

- Evaluate "soft-reconfiguration inbound always" knob

    - The use of the 'soft-reconfiguration inbound always' knob is highly memory-intensive, especially if additional paths are present.

    - Check BGP peers that lack route refresh capability and ensure this knob is only enabled for those specific peers.

    - Remove this knob from peers that do support route refresh to reclaim memory.

- Implement Route-Policy to Deny Some Prefixes

    - Create a route-policy to deny certain prefixes, which can help reduce the memory usage by limiting the number of routes that need to be processed and stored.

- Reduce the Number of BGP Peers

    - Decrease the number of BGP peers on the router to lower the overall memory consumption. This step is particularly useful if you have a large number of peers that contribute to the high memory usage.

- Restart BGP Process or Reload Router

    - Manually restarting the BGP process or reloading the router can help free up memory. This is a temporary solution but can be effective in mitigating immediate memory issues.

- Evaluate Memory-Intensive Features

    - Be aware that certain features like Non-Stop Routing (NSR), additional-paths, and maximum-path can contribute to increased memory usage.

    - Assess the necessity of these features and consider disabling or optimizing them if they are not critical to your network operations.

These steps can better manage memory usage and ensure the stability and performance of your BGP processes.

If the issue is still not recovered, collect logs and reach out to Cisco TAC:

```
show tech-support
show tech-support routing bgp
show processes memory detail <job id> location 0/rsp0/cpu0
show processes memory detail <job id> location 0/rsp1/cpu0
show memory summary location all
show memory heap <job id>  location 0/rsp0/cpu0
show memory heap <job id>  location 0/rsp1/cpu0
show memory heap dllname <job id>
show bgp scale
show bgp scale standby
show bgp all all process performance-statistics
show bgp all all process performance-statistics detail
```