NetApp Knowledge Base

Packet loss causing slowness and latency outside of ONTAP

https://kb.netapp.com/Advice_and_Troubleshooting/Data_Storage_Software/ONTAP_OS/Packet_loss_…

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Applies to

- ONTAP 9
- Data ONTAP operating in 7-mode

Issue

- When inspecting a packet trace, packet loss is usually identified by multiple duplicate acknowledgements (at least #1, #2, and #3) along with retransmissions
  - **Note:** An example is in the KB Why does packet loss impact performance?
- Application slowness and high i/o wait times are seen or users have performance issues or latency
- ONTAP latency is low and utilization of CPU and disk is lower than normal or expected
- Packet loss may be increasing in ONTAP 9.5 or higher

Example: Increasing `Rexmit` and `OOORcv` columns for 10.1.2.9 from netstat -anceWCT

```
node 1:
Proto Recv-Q Send-Q Rexmit OOORcv  0-win Local Address                  Foreign Address
=-=-=-=-=-=Sat Aug 13 2022, 23:16:01 -0400   BSD-NETSTAT-ANCEWCT 6 lines
tcp4       0      0 6198853 112463181      0 10.1.2.3.3260               10.1.2.9.
47254

=-=-=-=-=-=Sat Aug 20 2022, 23:26:09 -0400   BSD-NETSTAT-ANCEWCT 6 lines
tcp4       0      0 1304064 57461127       0 10.1.2.3.3260               10.1.2.9.
21933

node 2:
=-=-=-=-=-=Sat Aug 13 2022, 23:15:27 -0400   BSD-NETSTAT-ANCEWCT 6 lines
tcp4       0     48 5768522 3592331        0 10.40.40.27.3260            10.1.2.9.
43744

=-=-=-=-=-=Sat Aug 20 2022, 23:25:03 -0400   BSD-NETSTAT-ANCEWCT 6 lines
tcp4       0     48 1366568 11947331       0 10.40.40.27.3260            10.1.2.9.
43425
```

Cause

- Packet loss causes TCP to perform poorly, creating up to seconds of latency from the user or application end
- Packet loss can be due to many different causes:
  - MTU mismatch
  - Network congestion
  - Insufficient hardware
  - Faulty hardware (SFP, cable, etc.)
  - Asymmetric routing
  - Security hardware or software (firewall, antivirus, VPN, NAT, etc. that does man-in-the-middle packet inspection or OS level packet inspection) that does not forward packets quickly or drops packets
  - Small buffers on switch or network interface, or VM NIC driver
  - Mismatched speeds on sender and receiver

Solution

1. Confirm `ifstat` has 0 errors on the port of the data LIF
2. Check `event log show` to see if errors are logged about CRCs or network communication
3. Gather a packet trace (link below in Additional Information) and analyze for packet loss
   - Alternatively, on ONTAP 9.5 or higher netstat can be used
4. If both are clean, then the problem is upstream of storage and not a storage problem itself
5. Check upstream devices for the following conditions mentioned above
6. Ensure the switch doesn't have mismatched speeds or shallow buffers and reconfigure the network to be symmetric at sender and receiver
   - In between can be faster (like a backbone)
7. Work with your network and host teams to investigate and engage with network vendors as necessary for further assistance
8. Once the packet loss is fixed, reassess the latency and areas impacted.

Additional Information

- Why does packet loss impact performance?
- How to capture packet traces (tcpdump) on ONTAP 9.2+ systems
- How to collect a network trace with pktt in Data ONTAP 7-Mode
- To confirm we are seeing loss please use the following filter in Wireshark:
  - `tcp.analysis.duplicate_ack || tcp.analysis.retransmission || tcp.analysis.fast_retransmission || tcp.analysis.out_of_order`
- Some systems will have TCP flag called SACK, which can be used to identify how many packets went missing by Selectively Acknowledging what it did get
  - This Wireshark filter will let you see those packets:
    - `tcp.options.sack.count > 0`
- Another option is to use netstat to check for incrementing retransmits or zero windows in ONTAP 9.5 or newer