Cisco CCNA (200-301)

Identifying Per-Hop Behavior for QoS

Learning Objective: Identify characteristics of QoS Behaviors

Description: QoS behavior can help in prioritizing traffic across network devices. You will learn how to differentiate Classification, Marking, Queuing, Congestion, Policing and Shaping for QoS.

Q: What is QoS?

- Quality of Service - it is how we can work with a limited resource bandwidth and the expectations for different types of data.

Q: What do you mean by different types of data?

- e.g., voice, video and data are all effected by limited bandwidth.

Q: What do we need to understand about QoS to make this happen and is meant by per hop behavior?

- It is a set of behaviors we want to happen when traffic shaping. The per-hop behavior term is from MPLS (as well as Differentiated Services) to define policy and priority when a packet is crossing through a device (in our case a router).
- There are many factors that we should be aware of when discusing QoS.
- factors that go hand in hand **Classification** & Marking
    - Classification and marking should be done closest to the source of traffic as administratively and technically possible (If you control traffic end to end).
    - Classification and marking should be done closest to the source of traffic as administratively and technically possible within your administrative domain!
    - Best practice: not to trust QoS marking set by end user devices, unless adminstered by policy across the network.
- factors that go hand in hand Classification & **Marking**
    - Every node that has potential for congestion
    - Should be applied to WAN links and within LAN
    - Recommended: **DSCP (Differentiated Services Code Point) for marking when possible**
        - Normally to be leveraged at the access/distribution/core and edge hardware.
- We must identify traffic that we want to apply a policy , that's what classifying does.
- Then when we have classified it, we mark the data telling how we want that hop to treat the data.

Q: What is queuing used for in QoS?

- Each traffic class should be have a distinct queue
    - Real-time traffic --Expedited Forward PHB (RFC 3246)
    - Guaranteed bandwidth queue --Assured Forwarding PHB (RFC 2597)
    - Default & best effort queue--Default Forwarding PHB (RFC 2474)
    - Less than best effort queue--Lower Effort Per-hop Behavior (RFC 8622)
- 2 types of Queuing
    - CB-WFQ (Class Based Weighted Fair Queuing) puts traffic flows into classifications that can ensure the flow can use the all the bandwidth defined in configuration.
    - LLQ (Low Latency Queuing) instead of setting bandwidth for the flow, it sets a priority for the traffic flow not just when congested.

Q: Can you help us with idea of Congestion Avoidance?

- Congestion Avoidance
    - Used to selectively drop packets when predefined limit is reached
    - WRED (Weighted Random Early Detection)
        - Only used for some types of queues (not strict-priority, scavenger, and control traffic queues) such as default queues .

Q: One last question, What is the difference between Policing and Shaping?

- Traffic Conditioning

    - Policing--unwanted excess traffic should be dropped as soon as possible
    - Shaping--unwanted excess traffic is buffered rather than dropped.

Endnotes, External and etc.

- 4.7 Explain the forwarding per-hop behavior (PHB) for QoS such as classification, marking, queuing, congestion, policing, shaping