Video Tutorial - QoS Models (5 min)

In a very general understanding of QoS mechanisms, let's first look at the QoS models. The best effort model is not really an implementation of QoS, as packets are delivered on a best-effort basis. QoS is not really required or configured. The integrated services model, or IntServ model, provides a very high degree of QoS to IP packets with guaranteed delivery. It uses a signaling process known as RSVP, or resource reservation protocol. The IntServ model can severely limit the scalability of a network, and it is demanding on resources, and therefore doesn't scale well for large or enterprise networks.

The differentiated services model, or DiffServ model, is a highly scalable and flexible implementation of QoS. It works off of manually configured traffic classes which need to be configured on routers throughout the network.

If we look at some of the benefits and drawbacks of the best effort model, you can see that, under benefits, no special QoS mechanisms are required, and it is the easiest and quickest model to deploy. However, under drawbacks, notice that there are no guarantees of packet delivery. No packets have preferential treatment, and critical data is treated the same as casual email is treated. Basically, this is a non-QoS solution.

Now compare this to the integrated services model, looking at some of the benefits and drawbacks. Under benefits you can see that the IntServ model has tighter QoS for real-time traffic, uses the signaling protocol RSVP, resource reservation protocol. It requires end-to-end signaling and per-request admission control. It uses packet classification, policing, queueing, and scheduling. Under drawbacks, notice that the IntServ flow-based approach is not scalable to large implementations such as the internet, and the integrated services model is rarely deployed by itself alone.

Looking at this diagram, we can see that end-to-end signaling is required in the integrated services model. RSVP is implemented on the routers within the network and can be implemented on the hosts as well. Notice the QoS-aware nodes. Sessions and resources are dynamically reserved, one flow at a time. Now, looking at the differentiated services model, we can see some of the benefits and drawbacks.

Under benefits, the differentiated services model provides better QoS scalability. It is a defined, class-based approach defining the policy and priority at the routers, known as per-hop behavior, or PHB. It uses packet marking directly in the packets. In other words, packets are marked at the routers. It can also use the NBAR or NBAR2 network-based application recognition services. It uses the six-bit differentiated services code point, or DSCP, in the IP header, and is also used with IPv6.

Under drawbacks, it doesn't provide the absolute guarantee of services that integrated services does, and it requires a set of complex mechanisms to work throughout the network. This is why differentiated services is often used with integrated services. Both the integrated services and the differentiated services models are not exclusive, and they can be used together.

In this diagram of a differentiated services example, you can see that the QoS nodes are unaware that QoS is being implemented across the network. That's because a manual QS policy has been configured on the routers in the network. Notice that as traffic goes across the network, the traffic is classified and colored.