



**Reliance
Infocomm**

QoS and Impact on Scalability

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Impact of QoS

- Where do you provide QoS?
 - QoS at the edge
 - QoS in the core
- How complex is your QoS strategy?
 - Queuing
 - Buffering
 - Scheduling
 - Classes of Service
- What is the cost of providing QoS?
 - Capex and Opex
- What is the impact on day to day operations?
 - Provisioning
 - Maintenance
 - Troubleshooting

Edge vs Core

- Implementing QoS in the core increases the number of touch points
- Trade-off between QoS and scaling
- Decision points
 - Edge
 - 802.1p
 - DSCP
 - ToS
 - Customer marks packets appropriately (Managed CPE?)
 - Network marks packets for customer
 - Core
 - Over engineer core bandwidth
 - High speed links reduce QoS dependency
 - Queuing and scheduling
 - Diffserv aware Traffic Engineering

Complexity

- Implementing QoS is complex
- Needs exhaustive testing and validation to suit product mix
- Decision points
 - Number of queues: Software/Hardware
 - Defining strategies for applications and products
 - Queuing, buffering, and scheduling algorithms
 - Managing QoS using product definitions

Impact on Operations

- Implementing QoS makes network creation complex and expensive
- Subscriber provisioning is more involved
- Device configurations become (a lot) bigger
- Training to enhance skill sets of Operations personnel
- Monitoring and troubleshooting QoS issues on a network

QoS and Scaling

- QoS architecture and network creation are one-time activities
- Subscriber provisioning, monitoring, and troubleshooting are ongoing activities
- Complex QoS architectures and more number of touch points increase operational overhead
- Operations complexity limits scaling

QoS and Scaling

- The **KISS** philosophy
 - **K**ep **I**t **S**imple and **S**calable, not necessarily **S**tupid