



## Percentage Loss Versus Phone Loading

Upstream - Percentage Lost Frames



Downstream - Percentage Lost Frames

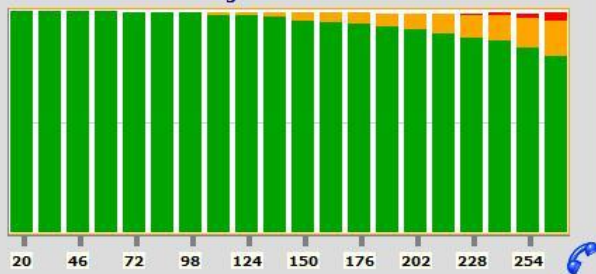


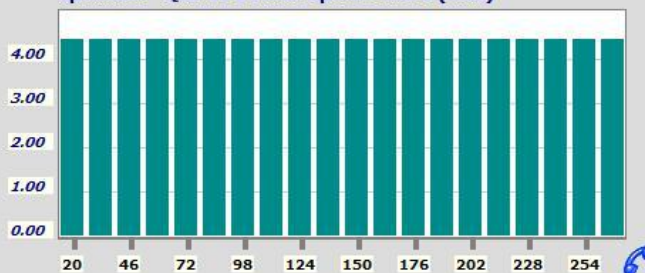
Diagram 3

This report illustrates the effect of varying the Phone Loading on the percentage of RTP frames that are lost by the network in the Test Path as a Service Level.

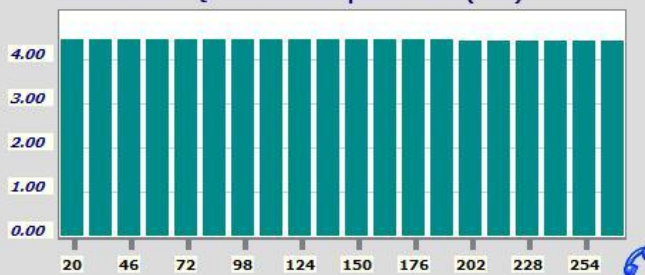
A green value indicates a good service level, orange a warning level and red a value outside of normal bounds. **Here is a problem with downstream, needed to be solved in the switches QoS configuration.**

## MoS versus Phone Loading

Upstream - QoS as a Mean Opinion Score (MOS)



Downstream - QoS as a Mean Opinion Score (MOS)



Explanation of colors in reports

	R values	MOS values	
	90 - 100	4.5 - 5.00	Very Satisfied
	80 - 89	4.0 - 4.49	Satisfied
	70 - 79	3.5 - 3.95	Some Users Dissatisfied
	60 - 69	3.0 - 3.49	Many Users Dissatisfied
	50 - 59	2.5 - 2.99	Nearly All Users Dissatisfied
	0 - 49	1 - 2.49	Poor

Diagram 4

This report illustrates the Quality of Service (QoS) experienced on the test connection in relation to Phone Loading expressed as a MoS Value.

MOS (mean opinion score : standard - ITU P.800) The lowest possible MOS value = 1.0 (total lack of user satisfaction), The highest possible MOS value = 5.0 (perfect speech reproduction) (In practice, MOS scores rarely exceed 4.5.)

**Those values are perfect for running VoIP.**

## Jitter Versus Phone Loading

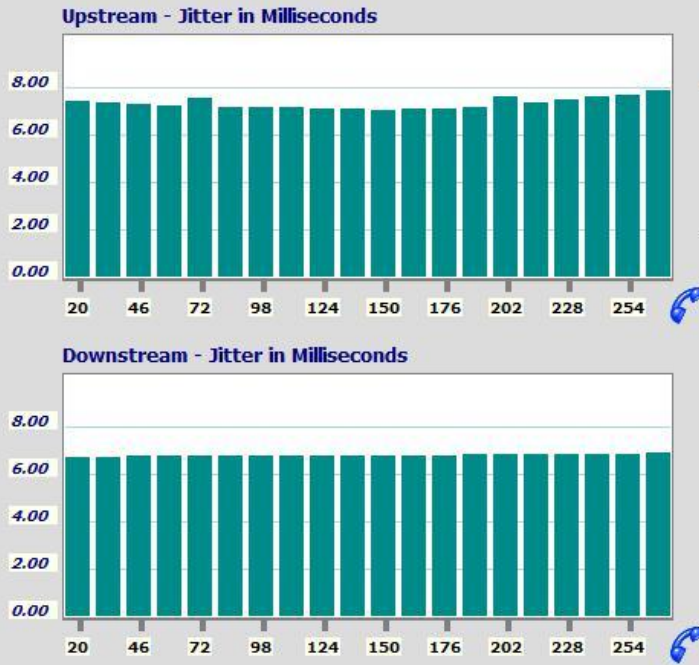


Diagram 5

This report illustrates the Jitter experienced on the test connection in relation to Phone Loading. Jitter occurs due to varying transit delay over the test path. The delay varies as RTP VoIP media packets are held up in Queues in Routers and Switches due to congestion on the link. Phones contain Jitter Buffers that mitigate the effect of Jitter by providing an elastic "time buffer". Packets that are too late are dropped by the Phone and are processed the same as Lost Packets. To improve Jitter performance the QoS engineering must be working properly and there must be enough bandwidth to support maximum Phone Loading. **Those values are within the recommended limits.**

**Conclusion:** After documentation of network measurements and conducted VoIP ready survey the setup needed to be changed was the switches' QoS configuration, to insure that the VoIP telephony solution would work without problems.