



### Emulation Parameter (Impairment) Summary Data Sheet

#### OVERVIEW

This document provides a summary and brief description of the emulation parameter (impairment) options available on NE-ONE Emulator.

iTrinegy wish to ensure you derive maximum value from your NE-ONE investment. If you maintain a valid iTrinegy Service Agreement, you will receive new impairment options as part of the code update process built into NE-ONE. These will ensure that, as networks environments evolve, your NE-ONE continues to meet your emulation needs.

Please check the “Last Updated/Version” for this document and ensure you are referencing the latest version.

**Last Updated/Version: Jan 2015/V1.2.0**

#### IMPAIRMENT OPTION

- **Link Speed Control**  
From 1bps to 1Gbps (depending on Model) in 1bps increments.
- **Congestion Control**  
Set Link congestion as a % of the link capacity.
- **FIFO Queueing**  
Queue size from 0 Bytes to 1MB in 1Byte increments.
- **RED (Random Early Drop) Queueing**  
Control RED Upper/Lower bounds.
- **Random Packet Loss**  
Set Maximum and Minimum % losses to nearest  $10^{-9}$  %
- **Poisson Packet Loss**  
Set Interval (in ms), Mean Loss (Packets per interval) and Standard Deviation.
- **Burst Loss**  
Control normal loss % as well as a (higher) burst loss %, specifying burst frequency and duration times.
- **Steady (1 in X) packet loss**  
Set X from 1 to  $10^{19}$  in increments of 1.
- **Packet Loss - Steady Bit error**  
Based on Steady Bit Error 1 in X - Set X from 1 to  $10^{19}$  in increments of 1
- **Steady Bit Errors (BER) 1 in X**  
Set X from 1 to  $10^{19}$  in increments of 1
- **Random Bit Error (between 1 in X and 1 in Y)**  
Set X and Y from 1 to  $10^{19}$  in increments of 1.
- **Burst Error Rate**  
As per Steady Bit Errors, with ability to “burst up” to a higher error rate for a specified duration and frequency (to nearest nanosecond).
- **Fixed Delay/Latency**  
Set delay to fixed value in nanoseconds (ns) up to 10 seconds (or more).
- **Random Delay/Latency**  
Set delay between minimum and maximum (10 seconds) values in milliseconds or nanoseconds to nearest nanosecond. This impairment creates Jitter.
- **Gaussian (Normal Distribution Delay/Latency)**  
With optional lower and upper bound limits. Specify mean and standard deviation delay in ms (to the nearest  $10^{-6}$ ms ), but also optionally specify a minimum lower bound (static circuit delay in ms) and a maximum (10s) upper bound delay in ms. Creates Gaussian Jitter.
- **Step Delay (Latency) per packet**  
Delay steps between a maximum (10s) and minimum value in nanoseconds (ns) incrementing and decrementing by a specified number of ns per packet.
- **Step Delay (Latency) Periodic**  
Delay varies between a maximum (10s) and minimum value in milliseconds (ms) stepping up and down interval.
- **Delay (Latency) Scenarios**  
Standard built-in values for pre-defined situations.
- **Inter-packet Gap Delay (latency)**  
Aimed at creating Jitter in high speed packet streams by specifying an inter-packet gap between a minimum and maximum (in ns). Fixed base circuit latency can also be specified.
- **Out Of Order**  
Based on a % probability, place a packet out of order by between a Minimum and Maximum, up to  $10^{19}$  Packet Positions
- **Fragmentation (MTU)**  
Specify MTU for link thus Fragment Packets if desired.
- **Maximum Packet Size**  
At least 9000 bytes (Jumbo Frames).