SPIRENT INE

HIGHLY REALISTIC RECREATION OF MULTI-SITE, MULTI-PATH, MULTI-USER NETWORKS

ENTERPRISE

The technology partnership between Spirent Communications and iTrinegy provides tools and services to enable you to adopt a proven procedure to analyse/predict, test and monitor networked application performance throughout the project lifecycle.

NETWORK EMULATOR-ENTERPRISE (INE-ENTERPRISE)

Spirent INE-Enterprise is an extremely cost-effective, feature-rich (Gigabit - 10/100/1000) network environment emulator that offers excellent price-to-function performance.

INE-Enterprise is the ideal tool for emulating the conditions likely to be encountered in a live application rollout, reducing the potential for costly failure & embarrassment.

Using INE Enterprise you will be able to see:

- How your applications perform when placed in a 'real' network?
- Whether increasing bandwidth will really increase performance?
- How an application will perform when deployed over a long distance (e.g. in a WAN)?
- If it is possible to reduce bandwidth without suffering loss of performance?
- How robust the application is to packet loss/damage or re-ordering?

INE-Enterprise is a 'network in a box' offering the following capabilities:

- Pre-deployment testing, verification and fine-tuning of applications from the safety of an off-line environment prior to implementation on the live network.
- The ability to alter the characteristics of a (LAN) segment in a live network to mimic, for example, a WAN.
- Quick, safe and precise pre-deployment testing and quality assurance of business-critical applications.
- Assistance in network design and capacity planning.
- Ability to perform multiple simultaneous emulations.

TYPES OF NETWORK THAT CAN BE CREATED

A variety of networks can be emulated, such as:

- High latency WANs (national, international)
- Satellite Networks
- Wireless networks (3G, LTE, WiFi, WiMAX)
- Jittery networks that cause VoIP deployments a problem
- QoS-based networks (i.e. MPLS)
- Point-to-Point (ATM)
- Radio/RoIP/IP-over-Radio
- Routed networks
- VLANS

PATH SEGMENTATION ADDS GREATER REALISM

INE-Enterprise uses the concept of virtual "pipes" to represent different network segments. You can configure a number of parameters that influence the traffic flows to emulate a specific network segment. See Features for more details. The setting for each pipe can be saved for easy retrieval later.

Traffic entering any of INE-Enterprise's physical interfaces passes through, and is influenced by, each pipe defined in a sequence before finally exiting another physical interface.

It is also possible to have pipe configurations dynamically change over time to more closely emulate real world conditions (e.g. increased packet loss during morning "rush hour").

FEATURES

To reflect real-world conditions, INE Enterprise allows the uplink and downlink parameters to be configured independently. These parameters include:

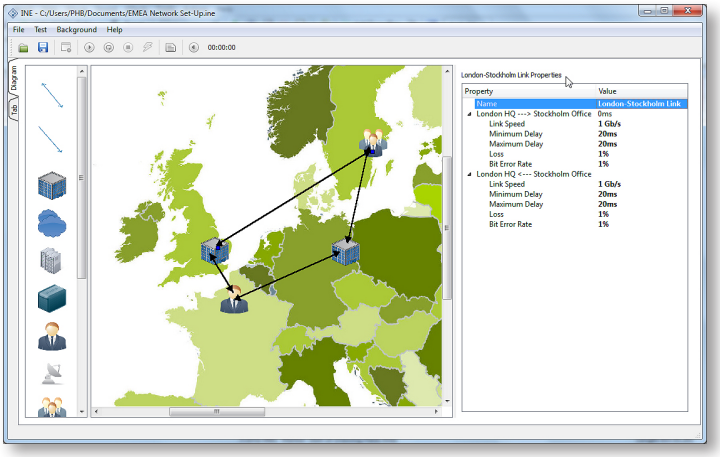
- **Link Speed (Bandwidth):** Sets the maximum speed (as bits per second) that the Virtual Pipe (also known as Virtual Interface or VI) will support.
- **Bandwidth Allocation:** Allocates bandwidth to IP Address/port/protocol/QoS combinations permitting emulation of packet shaping devices.
- **Delay (Latency):** Sets the time taken for the traffic to traverse the VI boundaries.
- **Jitter:** Variable latencies can be set
- **Queue length:** Sets the size of the buffer. If data is constrained by the emulation so that it cannot pass through quickly enough, packets will be dropped once the queue is full (as they would in the real world)
- **Filters:** Create groupings of traffic using address, port, protocol, VLAN etc.
- **Classes:** Apply bandwidth restrictions (including burst handling) and priorities to Filter Groupings, thus enabling traffic/packet shaping and non-FIFO packet prioritization as typically found in real-world networks.
- **Radio:** A full set of IP over Radio features including a Shared Radio network environment (i.e. simulating radio frequencies and one transmitter at a time) with MCTT— Maximum Continuous Transmission Time –control etc.
- **Enhanced Routing:** "Route" by IP address, Ethernet address, IP protocols, Ethernet protocol, custom etc., to other virtual pipes or physical network interfaces allowing a sophisticated emulation including QoS and different network paths to be created
- **Packet Drop/Loss:** Percentage loss, steady loss, custom loss. Burst loss supported.
- **Packet Error:** Percentage error, steady error, custom error. Burst loss supported
- **Packets sent in order:** Packets can be transported in the same order they were sent or the order can be jumbled.
- **Quality:** Selected traffic can be prioritised for preferential delivery

Other Features include:

- Control of Queue Sizes (Bytes or Packets)
- TTL decrement
- MTU – Fragment or drop packets larger than this
- Packets optionally out of order

A CHOICE OF USER INTERFACES

INE-Enterprise is supplied, as standard, with a tabular Web GUI. However, a simple-to-use, yet sophisticated Network Drawing Interface is available as an optional extra. This drag-and-drop multi-platform GUI, enables users to configure and control the emulator through a rich pallet of objects such as buildings, people, computers, routers etc which will build the scenario needed with the added ability to connect these objects by lines representing the network paths.



Spirent INE Enterprise's optional Drawing Interface enables you to quickly create multiple, simultaneous network paths, each one having its own specific network impairments

REPORTING, GRAPHING AND DATA EXPORT

Graphical and tabular reports are available and INE-Enterprise can produce log files of the dataflow through each interface of the Emulator in CSV format, for importing into other applications such as spreadsheets

INE-ENTERPRISE BENEFITS

INE-Enterprise will enable you to:

- Create a profile of current network characteristics and performance on a single box
- Establish a benchmark model to test and verify against
- Test over the emulated network from an off-line environment
- Identify potential disruptions to application performance by emulating a decreasing quality of connection.
- Fine tune applications and network strategies before implementation
- Develop, save, edit and re-use test templates
- Test using prioritised traffic

NETWORK CAPACITY PLANNING

INE-Enterprise allows you to develop and fine tune networks and applications before implementations.

For example:

- Discover if you really need the bandwidth you have
- Experience the effects of moving from a high-cost low bandwidth private WAN to a low cost but high latency VPN over Internet solution before actually making the change
- Emulate a WAN bandwidth increase to see if it provides the expected benefits

CLOUD, SERVER CONSOLIDATION & VIRTUALISATION PROOF OF CONCEPT TESTING

INE-Enterprise can recreate the network conditions of the new proposed cloud or virtualized environment so that you can test how applications will perform in these conditions before making the investment in the new cloud service or virtualisation technology. This ability to conduct realistic pre-deployment testing can help convince your senior decision makers about the benefits of adopting the new cloud delivery model or virtualised approach.

The INE Product Range

INE Enterprise is part of Spirent's comprehensive range of INE network emulator products designed to suit the needs of Application Developers, QA and Test Specialists, Network Professionals, IT Purchasers and Infrastructure Architects.

The range includes:

- **INE for Windows** –Network Emulation software for installation on to your Windows desktop.
- **INE Ultra** – High speed, high volume network emulation for large scale testing

SPECIFICATIONS			
INE Feature Description	**INE Windows**	**INE Enterprise**	**INE Ultra**
NETWORKING INTERFACES			
10/100/GigE Copper (RJ45) Ports	2	22	22
GigE Fibre (Multi-mode SFP, LC connector)	2	22	22
10 GigE Copper	0	0	4
10 GigE Fibre (Multi-mode SFP, LC connector)	0	0	4
BANDWIDTH EMULATION			
0.1 Kbps to 10 Mbps (including T1/E1, T3 rates)	Yes	Yes	Yes
10 Mbps to 1 Gbps (including OC3/12, STM1/4 rates)	No	Yes	Yes
1 Gbps to 10 Gbps (including OC48/192, STM16/64 rates)	No	No	Yes
Auto Classification	No	No	80000
Symmetrical and Asymmetrical Bandwidth	Yes	Yes	Yes
Dynamic Mobile Bandwidth (2.5G/3G/WiFi/WiMax)	Yes	Yes	Yes
Background Traffic Emulation	Yes	Yes	Yes
Dynamic Production Network Bandwidth Utilization Record/Playback (INE Network Profiler)	Yes	Yes	Yes
Number of SubNets per Port	0	Unlimited	Unlimited
Selective Traffic Passthrough	Yes	Yes	Yes
Routes per Virtual Interface (VI)	0	Unlimited	Unlimited
Packet Shaping	No	Yes	Yes
Switch/Router Queue Emulation	No	Yes	Yes
Packet Processing Performance (varies based on WAN Model Complexity)	10 Mbps	20 Gbps	›30 Gbps
OPERATING MODES			
Tunnel Mode, Bridge Mode, Routing Mode, Passthrough	Yes	Yes	Yes
Routing Mode	Yes	Yes	Yes
VLAN Switching/Trunking	No	Yes	Yes

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SPECIFICATIONS (CONTINUED)			
INE Feature Description	INE Windows	INE Enterprise	INE Ultra
LATENCY OPTIONS			
Fixed, Uniform Distribution/Jitter	Yes	Yes	Yes
WAN Latency Playback (using INE Network Profiler)	Yes	Yes	Yes
PACKET LOSS OPTIONS			
Periodic Loss, Random Loss, Burst Loss, Congestion	Yes	Yes	Yes
WAN Packet Loss Playback (using INE Network Profiler)	Yes	Yes	Yes
PHYSICAL ERROR OPTIONS			
Bit Errors	No	Yes	Yes
Link Faults (e.g. Routing Protocol Fail Over)	No	Yes	Yes
DYNAMIC PACKET EFFECTS			
Out–of–Order Packets, Duplicate Packets, IP Fragmentation, TTL Effects	No	Yes	Yes
NETWORKING FEATURES			
Traffic Filtering	Yes	Yes	Yes
Multicast/Broadcast Emulation	No	Yes	Yes
MAC/VLAN/MPLS-based WAN Emulation	No	Yes	Yes
User–configurable Bit Pattern Match–based WAN Emulation	No	Call	Call
IPv6	Call	Yes	Yes
IPv4	Yes	Yes	Yes
Dynamic Backup Routes based on Link Failure or Link Utilization Level	Call	Yes	Yes
Dynamic Path Selection (Probability, Time, Filter)	No	Yes	Yes
Multipoint Internet User Class Simulation	No	Yes	Yes
QoS Emulation	No	Yes	Yes
Deterministic Packet Erroring	Call	Call	Call
Real-time Packet Modification	No	Call	Call
Built-in Packet Capture Buffers	No	Yes	Yes
Load Tool & Test Automation Tool Integration	Call	Yes	Yes
Integration with Spirent Automation	Call	Yes	Yes
Virtual Interfaces	2	440	Unlimited
MANAGEMENT			
Console, Serial, Ethernet, Web GUI	No	Yes	Yes
Native Windows GUI	Yes	Yes	Yes
Advanced Multi-User Emulation Testing	No	Yes	Yes
Appliance Capacity Monitoring	Yes	Yes	Yes
Dynamically Configurable Parameters	Yes	Yes	Yes
Scenario Server	Yes	Yes	Yes

AMERICAS 1-800-SPIRENT • +1-818-676-2683 • sales@spirent.com

EUROPE AND THE MIDDLE EAST +44 (0) 1293 767979 • emeainfo@spirent.com

ASIA AND THE PACIFIC +86-10-8518-2539 • salesasia@spirent.com

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