

## Network Environment Emulation

### *If you need to know any of the following...*

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

### *...then read on - INE can answer your questions.*

#### **What is Itheon Network Emulator?**

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

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

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

- Pre-deployment testing, verification and fine-tuning of applications from the safety of an offline 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.

#### **Why is this necessary?**

By emulating a range of network conditions, INE will let you see how the application performs objectively from the user perspective, without impacting real world environments.

#### **Who will find INE Valuable?**

Network, Systems and Software specialists who are concerned with the planning, developing, implementation and testing of networks, hardware and software that must deliver the required applications performance.

#### **INE Features**

INE 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 offline 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

#### **How does INE benefit my business?**

No matter how much "laboratory" testing is performed, it is a reality that a significant proportion of new application implementations initially fail when rolled out into a live environment.

INE will reduce testing costs and time to implementation by simulating how new or existing applications or services will be affected in real world network environments.

For example, by using INE, you will be able to confidently and accurately predict whether a time-sensitive application will work over a high-latency satellite link before committing the investment.

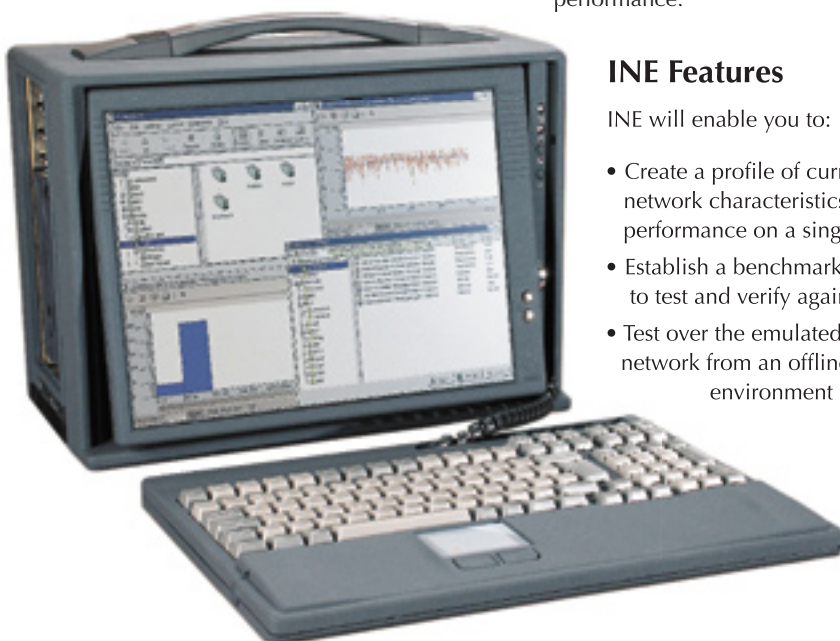
INE can also help in the post-deployment phase by checking the potential for service degradation or failure.

#### **How does the INE work?**

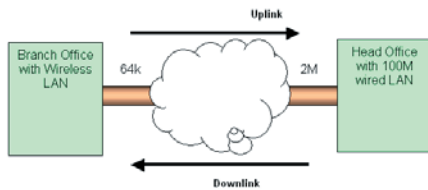
The INE uses the concept of virtual interfaces (VI). You can configure a number of parameters that influence the traffic flows to emulate a specific VI. The configurable parameters for each VI are shown below.

Traffic entering the INE physical interface passes through, and is influenced by, each virtual interface in turn before finally exiting a second physical interface.

As an example, the following end-to-end network could be simply emulated using just a few of the available VI parameters.



# Itheon Network Emulator (INE)



Itheon Network Emulator example VI configuration

VI 1	VI 2	VI 3	VI 4	VI 5
BW = 11M Pkt loss = 5%	BW = 64K	BW = 100M Latency = 150 msec	BW = 2M Q length = 16M	BW = 100M

(BW = Bandwidth [Link speed] in bits per sec)

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

## What parameters are user configurable?

To reflect real-world conditions the uplink and downlink parameters can be configured independently. These parameters include:

**Link Speed (Bandwidth):** Sets the maximum speed (as bits per second) that the VI will support.

**Delay (Latency):** Sets the time taken for the traffic to traverse the VI boundaries.

**Queue length:** Sets the size of the buffer. If data is being constrained by the emulation so that it cannot pass through quickly enough, packets will begin to be dropped once the queue is full (just as it would in the real world).

**Intercepted Dropped:** The selected percentage and actual number of packets that will be dropped.

**Intercepted Errored:** The selected percentage and actual number of packets that will be errored.

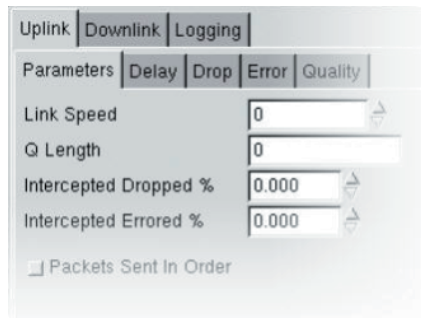
**Packets sent in order:** Packets can be transported in the same order they were sent or the order can be jumbled.

**Quality:** Selected traffic can be prioritised for preferential delivery

## Is INE easy to configure?

Yes, all you need to do is to configure at least one VI for an uplink and one for a

downlink. The parameters for each are grouped into five tabs as shown below.



The setting for each VI can be saved for easy retrieval later.

## Is Reporting and Graphing possible?

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

## Is INE easy to use?

INE is supplied pre-installed within a hardware appliance and is ready for immediate use.

## Can I use INE to test VoIP?

Yes, you can set any permutation of bandwidth, latency, packet loss & error, to simulate a wide range of network conditions (LAN & WAN). Easy-to-use scripts can even emulate a constantly changing environment. The INE can modify network conditions while real or simulated calls are active.

You can use the INE 'Quality' function to investigate the potential improvements possible with prioritised handling of voice calls in a congested network. Thus you can see packet loss improve for simulated calls or experience audio quality improvements for real calls.

## Can I use INE as part of my network capacity planning strategy?

INE allows you to develop and fine tune networks and applications before implementations. For example:

- Experience the operational implications 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
- Discover if you really need the bandwidth you have.
- Emulate a WAN bandwidth increase to see if it provides the expected benefits.

## In Summary:

Itheon Network Emulator (INE) is a simple, effective and accurate tool to enable users to simulate a wide range of network conditions and test the performance of their applications without investment in a huge array of network equipment.

## Key Points:

- Multiple comprehensively configurable Virtual Interfaces
- Network and vendor independent
- Rapid and simple deployment
- Future-proof multi-protocol deployment capability
- Low cost instrumentation
- Built to IETF and ITU International Standards



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