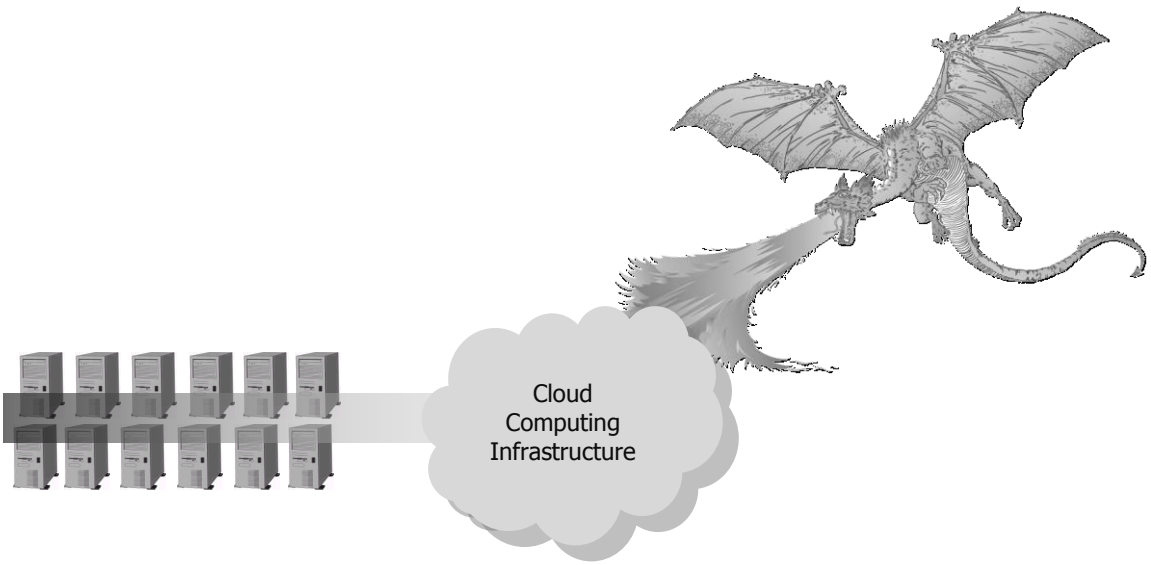
# FlameThrower™
## *The Power of Predictability*

## Preparing Cloud Computing for eReadiness



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# Preparing Cloud Computing for eReadiness

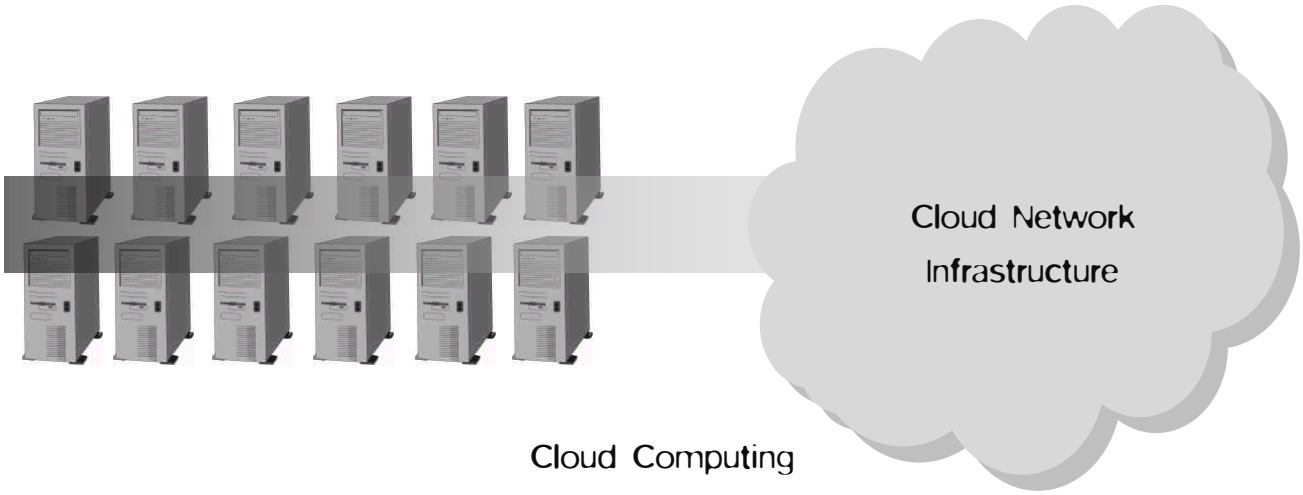
### Introduction

Cloud Computing is a computing paradigm in which tasks are assigned to a combination of connections, software and services accessed over a network. This network of servers and connections is collectively known as "the cloud." Today's Cloud Computing consists of networking equipments, servers, disk storage, virtualization technology, applications and services that have to reliably support the operations of the enterprise users and consumers.

Cloud Computing has become the giant "mainframe" computer that allows users to access supercomputer-level power. This means that, most resources are now centralized which gives tremendous benefits in security and, optimizing performance and access. This centralized environment can, however, turn into a nightmare without the necessary measurement and monitoring tools to enable effective security planning and performance optimization.

Furthermore, the explosive growth rate of online users and video traffic means that any Cloud Computing puts in place today may not be able to handle the Cloud Computing traffic a few months, or even weeks later. These mission critical sites are under constant pressure to enhance the customer experience.

New high-performance network and Cloud Computing technologies are being developed and deployed as quickly as they come to market in anticipation of the growth of the Cloud Computing. Each of the components on the Cloud Computing performs a major function either to improve the Cloud Computing performance or to make the Cloud Computing more secured. Logically, a typical Cloud Computing architecture consists of a Router, a Switch, a Firewall, a Traffic Shaper, a Web Cache, a Load Balancer, high-performance Servers and Storage Area Network devices. These functions may also reside in distinct devices or integrated into single system.



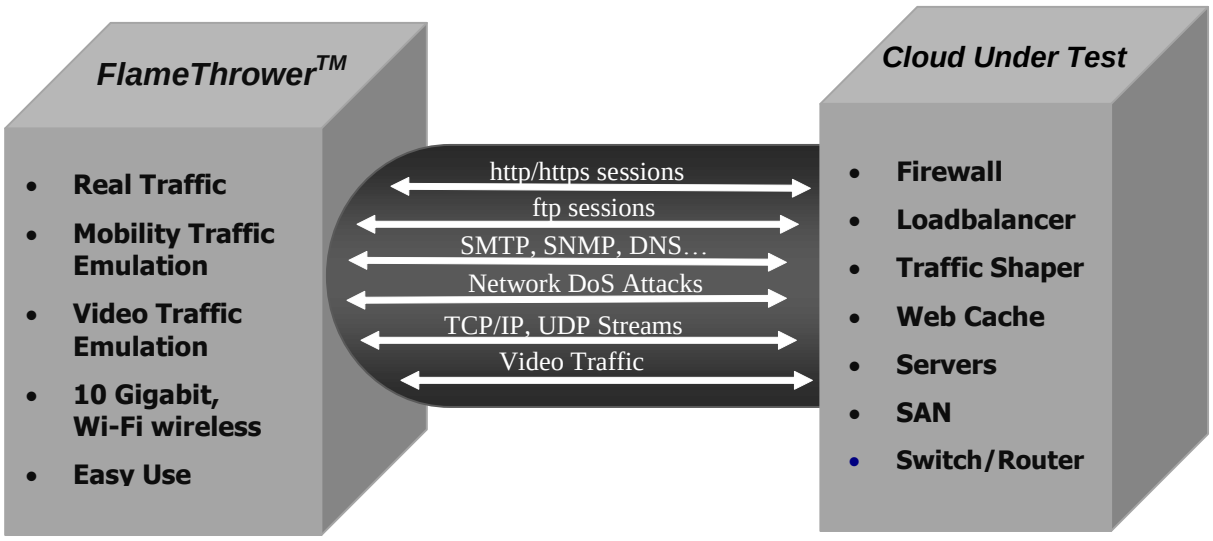
## Meeting Customer Expectations

Making sure a Cloud Computing performs to meet expectations from edge to core in a Cloud Computing network infrastructure has been virtually impossible. The performance of a Cloud Computing is no longer measured by how many Layer 2, Layer 3 or Layer 4 packets can get through, or by how many IP packets per second can be processed. It is now measured by how many concurrent HTTP sessions it can handle and how many applications and video transactions per second, per hour, per day the Cloud Computing can be supported.

Cloud Computing is also exposed to tens of millions of users on the Internet, both legitimate clients and intruders. They need to be set up to protect against attacks and more than that, they need to know what will happen to the throughput and capacity of the Cloud Computing under various types of attacks. Every component in the Cloud Computing fabric requires hundreds of policies to be set in order to work properly. Setting, tuning, optimizing and testing these policies under varying loads and conditions is currently limited, time consuming and error-prone.

## Antara FlameThrower Technology

FrameThrower provides a unique open and expandable platform based technology that emulates real world Cloud Computing traffic from a large number of virtual clients. It is a scalable, multi-port, configurable device upon which one can configure and generate real world sessions for the Cloud Under Test (CUT). These sessions are counted and measured for capacity, performance and operation of the CUT is monitored. FrameThrower can also generate network attacks and error conditions during tests and detect and measure performance degradation.



**Multi-ports 10 Gigabit to Wireless:**

FlameThrower is a multi-port system that can connect to ports(1 Gigabit, 10 Gigabit, Wi-Fi, WiMax wireless) of the device under test in numerous configurations and at various points on the network. For example, to test a firewall device, at least 3 ports are required, one for the entrusted network, one for the trusted network and one for the DMZ network. Testing LoadBalancers and other Web components requires more ports in order to fully exercise all the logical and physical data paths of the device under test. Individual ports or combinations of the ports can be set up to perform as clients or servers.

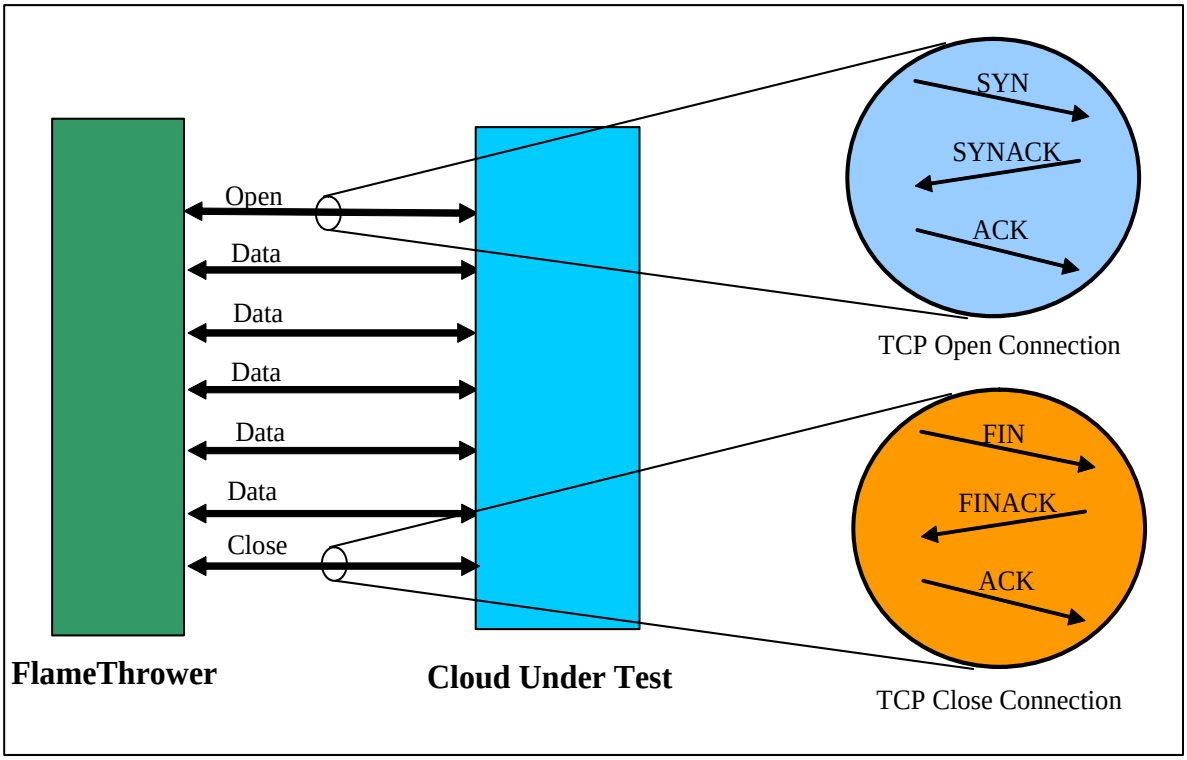
**Cloud Computing Traffic Emulation: High Number of Clients, Connections and Sessions**

FlameThrower can support a large number of client IP addresses. Millions of individual sessions can be established per single port or distributed among multiple ports.

FlameThrower also maintains state information for individual connections and sessions. (a connection is defined as a successful TCP Open & Close with or without data). Each session consists of the TCP Three-way Handshake: Open, the Data Transfer Phase and the TCP Three-way Handshake Close.

These millions of sessions can be used to test the capacity of the Cloud Computing under test to determine the maximum number of persistent connections, concurrent connections, number of simultaneous connections per IP address, etc.

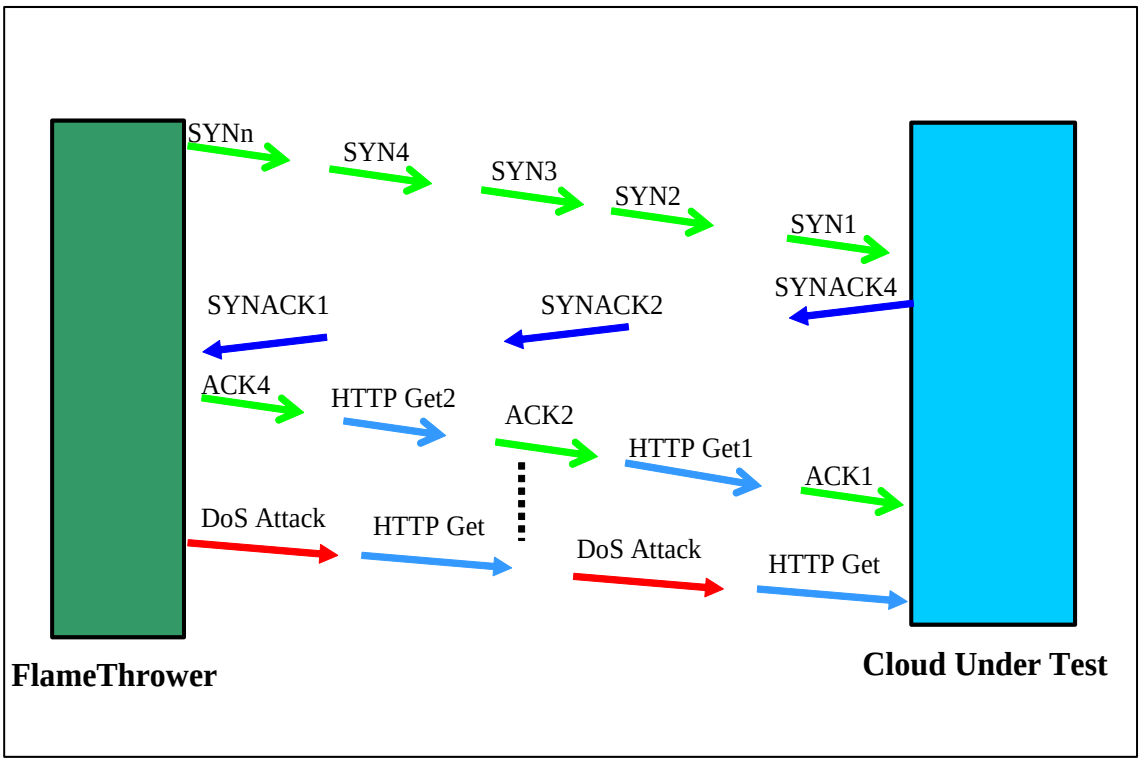
FlameThrower supports a large number of virtual IP addresses and uses the Address Resolution Protocol (ARP) to acquire the MAC addresses of the actual server ports.



FlameThrower can also mix a variety of protocols and attacks at different rates. This is a very important feature in creating real-world testing where many clients can request open connections simultaneously of the same Cloud Computing site. FlameThrower can send concurrent SYN packets to request TCP open connections at user configurable burst size and rate. It does not require waiting until all SYNACKs are received before establishing the connections and sending HTTP "get" requests.

FlameThrower also emulates real-world clients in servicing whatever packets are coming back from the WUT when ever they come. This includes delayed binding sessions and connection closes (FIN or RST) initiated from the real servers or from the devices proxied for the servers.

FlameThrower can also generate multiple URLs to request different file types and sizes. The HTTP requests can be sent out right after a successful TCP open or after all TCP connections have been opened. All significant results are logged and counted.



**Ease of Use and Extensible:**

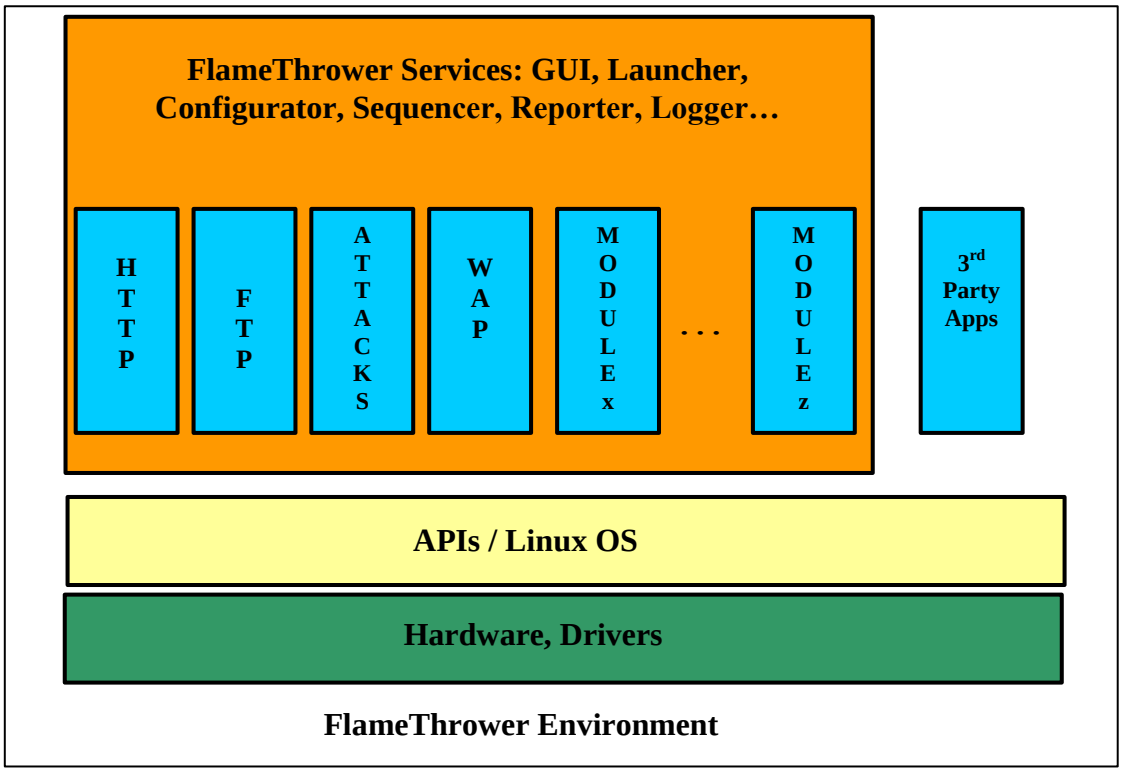
The FrameThrower is designed from the ground up to address Cloud Computing testing needs. The system hides under-lying complexities and provides an easy-to-use Graphical User Interface(GUI) that is divided into two major sections:

In the reporting section, users are provided with feedback on all modules running in the application. The feedback is in the form of graphs, a reports, and logs.

In the configuration section, users are given control for specifying the type of traffic to generate and monitor.

The System also provides a sequencer, allowing users to specify the order and time in which each protocol or attack type should be activated. Slider bars in the configuration section allow users to change the traffic rate up or down interactively.

FlameThrower is based on PCI Express and Linux platform which allows easy addition of new hardware modules and integration of other Web-based technology. The system is itself a network device and can be remotely managed.



## Conclusion

FlameThrower has been architected from the ground up to emulate real world traffic so that users can anticipate conditions they confront every day. By combining high-performance open and expandable system technology, FlameThrower can emulate real-world Cloud Computing traffic from Layer 2 to Layer 7 in a repeatable manner.