Red Piranha
unified threat management

CRYSTAL EYE APPLIANCE SPEED GUIDE

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This document provides guidelines for choosing the Crystal Eye UTM appliance based on performance benchmarks, feature guides and how they relate to real-world deployments.

Overview

Red Piranha's Crystal Eye XDR appliances offer some of the fastest throughput speeds available on the market today, using the latest generation hardware coupled with integrated security features.

This guide is designed to help you find the right Crystal Eye appliance for your environment.

Crystal Eye Throughput

Each of the Crystal Eye appliance models is rated with the following throughput.

Series	Firewall throughput	IDPS throughput	True Security Throughput	Typical usage
10	1Gbps	400Mbps	100Mbps	Small office or home office of up to 25 users with business grade NBN under moderate load.
20	2Gbps	800Mbps	250Mbps	Small office or branch office of up to 50 users with business grade NBN under higher load.
25	4Gbps	1.4Gbps	880Mbps	Medium sized enterprise of up to 75 users with moderate network traffic with 500Mbps or 1Gbps business link under moderate load.
30	4Gbps	1.4Gbps	880Mbps	Medium and larger sized enterprise of up to 75 users with high traffic volume capable of serving 1Gbps business link under higher load.
40	4Gbps	1.4Gbps	880Mbps	Larger sized enterprise of up to 75 users with high traffic volume capable of serving 1Gbps in mission critical applications needing High Availability in a single chassis.
50	34Gbps	2.5Gbps	1.4Gbps	High performance enterprise of up to 150 users and telecommunications class environments.
60	34Gbps	4.8Gbps	2.5Gbps	High performance enterprise of up to 250 users and telecommunications class environments.
80	74Gbps	17Gbps	12Gbps	High-performance enterprise and telecommunications class environments of up to 1,000 users with heavy user loads.

Defining Throughput Metrics

There are typically 3 different speed ratings quoted for different security appliances – firewall throughput, IDPS throughput and true security throughput.

Firewall throughput, (aka 'wire speed' or 'wire rate') simply means that you can take two ports of the same bandwidth, and transfer data between them with no packet loss. If there is a bottleneck somewhere inside the device (for example, a slow CPU on a lower-end device), then it's possible it will drop packets along the way, and not be able to forward at 'wire rate'. So, the claim of 'wire rate' implies that there is a non-blocking end-to-end data path, and that the forwarding engine is capable of making enough forwarding decisions on packets to not congest that data path (including features such as policing, shaping, queuing, compliance etc). Keep in mind that this only takes into consideration the data path between two ports on the system. A totally non-blocking system on all ports simultaneously only exists in the dreams of hardware design teams.

IDPS throughput is a measure of the bandwidth of the internal architecture of the appliance under intrusion detection and prevention mode, and is most commonly used for determining the ability of the appliance to process IDPS rules against incoming traffic without dropping packets.

True Security Throughput (TST) is the base speed your appliance has been tested to operate under peak load with both encrypted and non-encrypted traffic types. Bandwidth numbers are tested using stateful traffic using profiles that closely simulated an enterprise network. We test using a mix of HTTPS/HTTP browsing data (76%), real time applications like VoIP and video streaming (12%) in addition to other enterprise traffic types (12%). Traffic used in testing is mostly small realistic flows instead of elephant flows. It is very rare that your network link and users will operate at this peak for any period of time and these tests simulate load with all security functions of the appliance turned on.

A useful way to determine your speed requirements and the most suitable Crystal Eye model for you, is to take an average of the IDPS throughput and the TST speed and match that to your internet connection speed. For example, a 1 gigabit internet connection (which as we know doesn't give you the full 1 Gbps speed anyway) would be suited to the Crystal Eye Series 25 which has an average IDPS and TST speed of 1.1 Gbps and should provide more than enough bandwidth for this type of traffic. It's also important to note that this also depends on the user base and workload behind your appliance. A network with a heavier user base will sit closer to the TST number while a network with less heavy use will sit up closer to the IDPS speed.

Bandwidth and Latency

Hardware speed is a practical measurement of bandwidth for a given application. There is an important distinction between the terms "bandwidth" and "latency". Bandwidth is a measure of how much data can be transferred in a given time interval and is measured in bps (bits per second), Mbps (Megabits per second) or Gbps (Gigabits per second).

Using the age-old analogy of the water hose – bandwidth is how fat the hose is, and by extension, how much water is travelling through it. Latency is a measure of how long it takes to get from one end of the system to the other end. In the water hose example – while a lot of water might be rushing through the hose, it still has some way to travel to get to the other end. Latency is usually measured in ms (milliseconds). Applications that are time sensitive usually strive for low latency.

For transferring a large file via FTP, bandwidth is the priority. You want the transfer to happen quickly, which means pushing a lot of data. For talking on the phone over a VoIP network, latency is a priority. The packets are small, but you need them to arrive quickly. High latency will result in a delay between when the speaker speaks and the receiver hears.

Hardware Specifications

Key Points for new hardware

- Up to 2x system storage capacity
- Up to 6x system storage transfer speeds
- 75% increase in system storage reliability
- Gen10 Processors delivering 10% performance increase

Choosing the right model

Crystal Eye comes in 8 base models with the ability to include options ensuring a wide range of solutions are available to be tailored to specific requirements.

Unlike other providers, Crystal Eye appliances deliver the same feature set across the entire hardware range, with the only differences in the hardware to cater for various applications.

Small to Medium business solutions

The Crystal Eye Series 10 to Series 30 appliances are well suited to small or medium businesses allowing rapid deployment while still delivering the full Crystal Eye feature set as offered in the high performance models.

Series	CE 10	CE 20	CE 25	CE 30
Processor	Pentium G5400 2c 3.7Ghz	Intel Core i3-10100 4c 8t 3.6Ghz	Intel Core i5-10400 6c 12t 2.9Ghz	Intel Core i5-10400 6c 12t 2.9Ghz
RAM	16GB DDR4 2666Mhz	32GB DDR4 2666Mhz	32GB DDR4 2666Mhz	32GB DDR4 2666Mhz
WAN	1 x Intel Gbps	2 x Intel Gbps	2 x Intel Gbps	2 x Intel Gbps
LAN	1 x Intel Gbps	4 x Intel Gbps	4 x Intel Gbps	4 x Intel Gbps
Wireless	802.11, Bluetooth	802.11, Bluetooth	802.11, Bluetooth	-
System Storage	240GB M.2 NVMe PCIe	240GB M.2 NVMe PCI	500GB M.2 NVME PCIe	500GB M.2 NVME PCIe
Storage Option	1 x 2.5 inch SSD up to 4TB	1 x 2.5 inch SSD up to 4TB	1 x 2.5 inch SSD up to 4TB	1 x 2.5 SSD up to 4TB
Form Factor Dimensions (mm)	Desktop 280x300x80	Desktop 280x300x80	Desktop 280x300x80	1U Rack 248x423x88

Enterprise solutions

The Crystal Eye Series 40 to Series 80 are designed with the large enterprise and telecommunications provider in mind, capable of supporting demanding applications with flexible configurations packaged in low profile enclosures.

Series	CE 40	CE 50	CE 60	CE 80
Processor	Dual Intel Generation 10 i-5-10400 (6 cores, 12 threads, 2.9GHz per CPU)	Intel Generation 10 i-7-10700 (8 cores, 16 threads, 4.9Ghz)	Intel i9-10900 10c 20t 5.2Ghz	2 x Intel Xeon E5-2697v4 CPU 2.3Ghz
RAM	64GB DDR4 2666MHz (32GB per CPU)	64GB DDR4 2666MHz	64GB DDR4 2666MHz	128GB DDR4 2666MHz
WAN	4 x Intel Gb WAN port (2 per CPU)	1 x Intel Gb WAN port, 1 x 10Gb WAN port	1 x Intel Gb WAN port, 1 x 10b WAN port	See SFP ports
LAN	8 x Intel Gb LAN port (4 per CPU)	4 x Intel Gb LAN port, 4 Intel 10GB LAN	4 x Intel Gb LAN port, 4 Intel 10GB LAN	4 x Intel X710-T4 10Gb LAN
Management Port	-	-	-	2
SFP Ports	-	2 x DUAL SFP 10Gb	2 x DUAL SFP 10Gb	2 x Intel XL710-QDA2 Dual Port 40Gb WAN Dual port Total 80gb 2 x Intel XL710-QDA2 Dual Port 40Gb LAN Dual port Total 80gb
System Storage	System Drive 2 x 500G M.2 NVME PCIe Gen 4 SSD included (1 per CPU)	System Drive 1 x 500GB M.2 NVME PCIe Gen 4 SSD included	System Drive 1 x 500GB M.2 NVME PCIe Gen 4 SSD included	System Drive 1 x 500GB M.2 NVME PCIe Gen 4 SSD included
Storage Option	4 x 2.5in SSD to 4TB per drive (2 per CPU)	Up to 6 x 2.5 inch SATA 3 SSD up to 4TB/drive plus 1 additional M.2 512GB NVMe	Up to 6 x 2.5 inch SATA 3 SSD up to 4TB/drive plus 1 additional M.2 512GB NVMe	Up to 6 x 2.5 inch SSD up to 4TB/drive
Form Factor Dimension	2U Rack	2U Rack	2U Rack	2U Rack

Specialist custom solutions

Red Piranha will also build custom solutions to order from the cluster ready Crystal Eye 100 single unit equipped with Napatech 100Gbps networking and hardware level programmable firewall suitable for extremely high speed throughput applications and the Crystal Eye 200, a custom solution packaged in a dedicated rack configured to cater to high performance or unique applications.

Conclusion

Each network or scenario is different in utilization, structure and future demands. This guide is to highlight common configurations to help you make an informed decision on the Crystal Eye Appliance that best suits your current and future requirements.

Red Piranha is partnered with internarial organisations like the OISF and IEEE and maintains and tests with industry standard best practice in mind to attain the best outcomes for its clients and partners. Crystal Eye has undergone independent testing and Red

Piranha's Testing methodologies peer reviewed and published with the Institute of Electrical and Eletronic's Engineers (IEEE).

Further publications on methodologies and works can be found.

https://ieeexplore.ieee.org/document/8971192

https://redpiranha.net/news/red-piranha-raises-bar-60-gbps-suricata-throughput

Red Piranha makes its science in regard to testing available to its partners and other educational institutions.

It is important to stress that planning for future growth will ensure that the Crystal Eye device you choose will be well utilized and continue to deliver consistent ROI while serving your end users for many years to come.