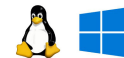


## Intel Atom® E3845 4 LAN AES-NI 4G Fanless Firewall Router

🔗 <https://www.pondesk.com/product/MNHO-048>

### Features

- Small Security Gateway, Firewall Router, Mini Server
- Intel Atom® E3845 Quad Core Processor
- 4 Threads, 2M Cache, up to 1.91 GHz
- Four Intel I211-AT Gigabit Ethernet
- Intel® AES-NI & Secure Key
- Dual Display, USB 2.0, USB3.0
- Support WiFi, 3G/4G WWAN Networks (optional)
- Support up to 8GB DDR3L Memory
- Support Dual Storage (mSATA SSD & 2.5" SATA SSD/HDD)
- Intel® HD Graphics
- Aluminium Alloy Dustproof Fanless
- Energy Efficient 10W (idle) Low Power Consumption
- Ready for IoT - Simply Connected Using 3G/4G LTE via Mini PCIe
- Easy Installation & VESA Mounting Capabilities
- Support Windows/Linux/Unix/Firewalls etc.
- Can be configured as a Firewall, LAN/WAN Router, VPN, DNS Server, DHCP Server
- Perfect for Security Gateway, Server, VPN and Firewall such as pfSense, Untangle, Sophos, Smoothwall, ClearOS, m0n0wall etc.



### Specifications

#### Processor

Intel Atom® Processor E3845  
4 Core, 4 Threads  
2M Cache, 1.91 GHz

#### Memory

Support up to 8GB  
DDR3L SODIMM 1.35V Low Voltage  
non-ECC Memory  
One Memory Slot

#### Storage

Support 1 x mSATA SSD  
Support 1 x 2.5" SATA SSD/HDD

#### LAN

Four Gigabit Ethernet Ports  
Intel I211-AT Gigabit Ethernet Controller

#### Expansion Slots

One mSATA Slot (For SSD)  
One mini PCIe Slot (For WiFi/WWAN Module)

#### I/O Interfaces

4 x Gigabit Ethernet  
1 x VGA  
1 x HDMI  
1 x USB 2.0, 1 x USB 3.0

#### Graphics

Intel HD Graphics  
Intel® Quick Sync Video

#### OS

Support Windows/Windows Server/  
Linux/Unix/Firewalls pfSense, Untangle,  
Debian, Sophos, FreeBSD,  
Smoothwall, Endian, ClearOS,  
m0n0wall etc.

#### Advanced Technologies

Intel® Virtualization Technology (VT-x)  
Intel® VT-x with Extended Page Tables (EPT)  
Intel® 64  
Enhanced Intel SpeedStep® Technology  
Intel® HD Audio Technology

#### Security & Reliability

Intel® AES New Instructions  
Execute Disable Bit

#### Onboard I/O

1 x SYS FAN (1\*3pin)  
1 x DT-126RP-02P Terminal Block  
1 x CTR1 (2\*5pin)  
1 x SATA2.0  
1 x BAT1 CMOS (1\*2pin)  
1 x mini PCIe (For WiFi/WWAN)  
1 x mSATA (for SSD)  
1 x 6pin SIM connector

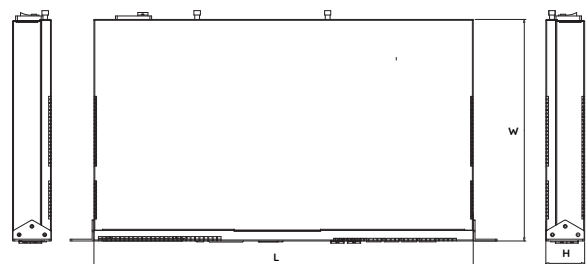
#### Power & Working Environment

Adapter Input: AC 100-240V ~ 50-60Hz  
Adapter Output: DC 12V 5A  
System Input: DC 12V  
Consumption: 9W-14W  
Operating Temperature: -10°C ~ 55°C  
Storage Temperature: -20°C ~ 70°C  
Humidity: 5% - 95% Non-Condensing

#### Others

BIOS: AMI  
Chassis Material: Aluminium Alloy  
Cooling: Completely Fanless  
Weight: 0.5 KG  
Package: 1 x Mini PC  
1 x Power Adapter  
1 x Cord

### Dimensions



134mm x 126mm x 40.6mm (L\*W\*H)

### Package

MODEL # MNHO-048  
P/N: M048E38ND4L

- 1 x Mini Server
- 1 x Power Adapter
- 1 x Power Cord

### Optional

#### 3G/4G/WiFi

802.11 b/g/n WiFi (PCIe Module)  
802.11 AC WiFi (PCIe Module)  
3G (up to 14.4 Mbps)  
4G (up to 150 Mbps)  
3G (14.4 Mbps) + USB N WiFi  
4G (150 Mbps) + USB N WiFi  
2GB/4GB/8GB DDR3L Memory  
16GB/32GB/64GB/120GB/240GB mSATA SSD  
500GB/1TB/2TB 2.5" SATA HDD  
16GB/32GB/64GB/120GB/240GB/480GB 2.5" SATA SSD

Memory  
mSATA SSD  
2.5" SATA HDD  
2.5" SATA SSD

CE FCC RoHS

This section describes the real-world performance of network firewall router hardware with respect to multiple Firewall/Router/All-In-One OS. There are many factors which influence the performance of firewall/routing etc.

1. Throughput
2. Features/Applications
3. Version of OS
4. Network Card Chipset
5. Number of Users

## 1. Throughput

Traffic Load is very major part of performance notes, if there is less traffic then less load on device CPU & RAM with better performance. More traffic needs more processing and can reduce the through of appliance.

## 2. Features/Applications

Most of features do not factor into hardware performance though a few have significant impact on hardware utilization.

### VPN:

Heavy use of any of the VPN services included in pfSense, Untangle & Sophos etc. will increase CPU requirements. Encrypting and decrypting traffic is CPU intensive. The number of connections is much less of a concern than the throughput required.

- 266 MHz CPU will max out at around 4 Mbps of IPsec throughput
- 500 MHz CPU can push 10-15 Mbps of IPsec
- i7 CPU or Xeon new generation support 100 Mbps of IPsec traffic

Supported encryption cards, such as several from Hifn, are capable of significantly reducing CPU requirements.

### Squid - Squidguard:

Outgoing traffic control through proxy both packages rely heavily both the CPU and disk writes. It is therefore strongly recommended to use with the Entry level and the use of AUTM and AUTM2 with DOM devices.

For this kind of work is strongly recommended to use AUTM, AUTM2 and microcluster with SSD or classics disks. However, it is also possible the optimized use with only the squid package on the entry level as long as you turn off any kind of writing on the disk media and strong expense of performance.

### Captive Portal:

While the primary concern is typically throughput, environments with hundreds of simultaneous captive portal users (of which there are many) will require slightly more CPU power than recommended above.

### Large State Tables:

State table entries require about 1 KB of RAM each. The default state table, when full at 10,000 entries, takes up a little less than 10 MB RAM. For large environments requiring state tables with hundreds of thousands of connections, ensure adequate RAM is available.

### Packages:

Some of the packages increase RAM requirements significantly. Snort and ntop are two that should not be installed on a system with less than 512 MB RAM.

## 3. Version of OS

We must emphasize the difference between the two types of installations that you can do with pfSense and Untangle etc. on the different devices

- The embedded solution (firewall Entry Level) does NOT allow the writing of log files on the memory (CF or DOM) and in any case, it is strongly discouraged. This version is not possible to install some additional packages of pfSense® and Untangle.
- The solution that installs on your hard disk (usually on the UTM Appliance solutions or above) has the ability to save logs in it. On this version, you can install all additional packages provided for pfSense® and Untangle.

## 4. Network Card Chipset

The choice of a network card is essential for anyone who is planning a system for medium / large dimensions.

- The Realtek chipset is less powerful than Intel Chipset and is mainly suitable for workloads less intense. However, for a company that does not require high throughputs.
- The Intel chipset, on the other hand, offers better performances in heavy traffic: it offers several advanced features such as queue management and, from the 2.2 version of pfSense, it also improved the multi-core support. This means a higher throughput and a reduced load on the CPU.

## 5. Number Of Users

Firewall performance also dependent of number of users behind it, more users more state table entries and more hardware resources required.

# Real World Hardware Performance Statistics

MNHO-048

Below mentioned are few real-world stress tests performed with different firewall OS on standard network firewall router box hardware with the following configurations.

**Intel:** Atom® Processor E3845  
**RAM:** 8GB DDR3L Memory  
**SSD:** 16GB mSATA3 SSD

			pfSense®	Untangle	Sophos	Zentyal	VyOS
Number Of Users			500-3500	500-3500	500-3500	500-3500	500-3500
Throughput	Bridge	End to End	TCP 1750 - 1850 Mbps	TCP 1890 - 1920 Mbps	TCP 1880 - 1900 Mbps	TCP 1800-1870 Mbps	--
			UDP 1500- 1600 Mbps	UDP 1750- 1790 Mbps	UDP 1750- 1800 Mbps	UDP 1750-1800 Mbps	--
		WAN to LAN	TCP 1600-1700 Mbps	TCP 1700-1720 Mbps	TCP 1720-1750 Mbps	TCP 1700-1730 Mbps	--
			UDP 1580-1700 Mbps	UDP 1710-1750 Mbps	UDP 1730-1760 Mbps	UDP 1730-1750 Mbps	--
	Routed		TCP 1620-1750 Mbps	TCP 1750-1800 Mbps	TCP 1760-1800 Mbps	TCP 1760-1800 Mbps	TCP 1900-1960 Mbps
			UDP 1650-1800 Mbps	UDP 1750-1850 Mbps	UDP 1760-1900 Mbps	UDP 1750-1880 Mbps	UDP 1910-1970 Mbps
	NAT		TCP 1680-1800 Mbps	TCP 1780-1880 Mbps	TCP 1800-1880 Mbps	TCP 1800-1850 Mbps	TCP 1900-1970 Mbps
			UDP 1700-1850 Mbps	UDP 1840-1900 Mbps	UDP 1850-1900 Mbps	UDP 1850-1900 Mbps	UDP 1900-1970 Mbps
	OpenVPN	AES128	TCP 75-95 Mbps	TCP 85-100 Mbps	TCP 85-110 Mbps	TCP 85-100 Mbps	--
			UDP 85-95 Mbps	UDP 90-95Mbps	UDP 100-110Mbps	UDP 100-110 Mbps	--
		AES256	TCP 100-115 Mbps	TCP 100-110Mbps	TCP 110-120Mbps	TCP 110-130 Mbps	--
			UDP 110-115 Mbps	UDP 110-120 Mbps	UDP 110-130 Mbps	UDP 115-130 Mbps	--
		Blowfish	TCP 110-120 Mbps	TCP 115-125Mbps	TCP 120-130Mbps	TCP 120-130 Mbps	--
			UDP 115-120 Mbps	UDP 120-130Mbps	UDP 125-130Mbps	UDP 125-140 Mbps	--
	IPSec	AES128	TCP 300 -310 Mbps	TCP 300 -320 Mbps	TCP 280 -300 Mbps	TCP 290 -310 Mbps	TCP 800-840 Mbps
			UDP 580-600 Mbps	UDP 600-615Mbps	UDP 580-600Mbps	UDP 540-580 Mbps	UDP 1300-1380 Mbps
		AES256	TCP 220-250 Mbps	TCP 250-280 Mbps	TCP 230-270 Mbps	TCP 230-270 Mbps	TCP 730-780 Mbps
			UDP 450-490 Mbps	UDP 490-520 Mbps	UDP 470-500 Mbps	UDP 460-490 Mbps	UDP 1140-1180 Mbps
		Blowfish128	TCP 320-350 Mbps	TCP 350-360 Mbps	TCP 360-370 Mbps	TCP 360-370 Mbps	TCP 700-780 Mbps
			UDP 450-460 Mbps	UDP 460-470Mbps	UDP 460-470Mbps	UDP 460-480 Mbps	UDP 900-940 Mbps
		3DES	TCP 75-95 Mbps	TCP 85-100 Mbps	TCP 90-100 Mbps	TCP 90-100 Mbps	TCP 200-240 Mbps
			UDP 85-100 Mbps	UDP 90-110 Mbps	UDP 95-110 Mbps	UDP 95-110 Mbps	UDP 220-260 Mbps
	L2TP	GRE	TCP 400-430 Mbps	TCP 410-430 Mbps	TCP 420-440 Mbps	TCP 410-440 Mbps	TCP 960-1000 Mbps
			UDP 420-450 Mbps	UDP 420-440 Mbps	UDP 430-450 Mbps	UDP 420-440 Mbps	UDP 940-980 Mbps
Max Active Connections			11 Million*	11 Million*	11 Million*	11 Million*	11 Million*
Max Concurrent Sessions			0.9 Million*	0.9 Million*	0.9 Million*	0.9 Million*	0.9 Million*
Max New Connections Per Second			40,000	40,000	40,000	40,000	40,000
Stateful Inspection			15 Gbps	15 Gbps	15 Gbps	15 Gbps	15 Gbps
IPSec Site-To-Site VPN Peers			200-600	200-600	200-600	200-600	200-600
Basic TCP Unicast			Transfer-80 Mbytes	Transfer-90 Mbytes	Transfer-100 Mbytes	Transfer-100 Mbytes	Transfer-90 Mbytes
			Bandwidth-550 Mbytes	Bandwidth-600 Mbytes	Bandwidth-670 Mbytes	Bandwidth-680 Mbytes	Bandwidth-700 Mbytes
Bidirectional Testing			Transfer-80 Mbytes	Transfer-90 Mbytes	Transfer-90 Mbytes	Transfer-90 Mbytes	Transfer-90 Mbytes
			Bandwidth-900 Mbytes	Bandwidth-950 Mbytes	Bandwidth-930 Mbytes	Bandwidth-910 Mbytes	Bandwidth-950 Mbytes
Parallel TCP Connections			Transfer-120 Mbytes	Transfer-140 Mbytes	Transfer-150 Mbytes	Transfer-150 Mbytes	Transfer-140 Mbytes
			Bandwidth-940 Mbytes	Bandwidth-980 Mbytes	Bandwidth-970 Mbytes	Bandwidth-950 Mbytes	Bandwidth-980 Mbytes
UDP Mode			Bandwidth-890 Mbytes	Bandwidth-890 Mbytes	Bandwidth-900 Mbytes	Bandwidth-920 Mbytes	Bandwidth-890 Mbytes

\* These are not theoretical stats, these are real world stats, means generated at the time of full system load. You can consider them a minimum level of the number. You will get more than that in your environment.

## Note:

Server ports are capable of handling more than 95% of hardware limit, like 950-980Mbps per port. Remember that this is real time hardware performance statistics captured during ideal environment. These might be different according to traffic load, complexity of configuration and processor/memory/storage specifications. Most important OS, if OS is more stable and have smaller footprint then performance should be high.