Lanner

White Paper

The 6th Generation Intel® Core™ Processors Further Strengthens Enterprise Cyber Protections

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Overview

The increasing number of malicious web attacks has driven major corporations to have deployed multiple security measures including proxy servers, firewalls, multiple anti-virus scanning engines and encryption technologies against various types of cyber crime. While these measures are working 24/7 to keep the enterprise network safe, they system loads may eventually experience performance degradations due to high CPU workloads.

The reasons are simple. Proxy, firewalls and multi-scanning generate plenty of loads and the CPU has to handle all of the loads, such as encryption and decryption. Whenever a proxy server is performing its functions, it generates a substantial load onto the servers, and the CPU is required to encrypt and decrypt the loads. Whenever a firewall is on duty, it generates high CPU flows due to traffic management, packet inspection and options screening. Lastly, to ensure zero-conflicts during multi-scanning against viruses, the CPU must be at optimal state to process all the requests to avoid system freeze.

As mentioned above, most security measures require a powerful CPU that can optimally handle all the requests at a short period of time to ensure smooth running. Therefore, the key is CPU clock speed. Faster clock frequency indicates higher data flow-through at a given time interval and higher responsiveness when executing mission-critical instructions. In other words, clock speed is one of the most significant indicators about how fast the CPU can process the data.

To address the issue, Intel® has launched the 6th Generation Core™ processors (formerly codenamed “Skylake”), which integrates ultra processing power, clock rates and frequencies. The turbo-up processing power will crucially strengthen the performance in running proxy servers, encryption engines, firewall packet inspections and multi-scanning deployments, which would also save TCO while improving serviceability at the competitive edge.

Technological Benefits of the 6th Generation Intel® Core™ Processors

The 6th generation Intel® Core™ processor family is in microarchitecture design using the 14nm manufacturing process. According to Intel®, the launch of the 6th Generation Core™ processor serves as the “Tock” of its “Tick-Tock” roadmap. Major technological benefits focus on breaking-through system performances, ultra clock rates, DDR4 memory, and rich security instructions.

One of the major innovations of the 6th Generation Intel Core™ processor is the emphasis on high clock frequencies. Taking Intel® Core™ i7-6700TE Processor for example, the base clock rate is 2.40GHz, and once Intel® Turbo Boost Technology 2.0 is enabled, the frequency can reach up to 3.40GHz. Another significant example is Intel® Xeon™ E3-1225 V5 Processor. The base clock rate is 3.40 GHz already, and with turbo engine, it can run up to 3.70 GHz, which can sufficiently process huge data flow at a defined period of time.

On the other hand, majority of the 6th Generation Intel® Core™ processors are programmed with Intel® Hyper-Threading Technology to enable multi-tasking while remaining at peak performance. With both Intel® Turbo Boost Technology 2.0 and Intel® Hyper-Threading Technology, the CPU utilization remains at the optimal balance even under heavy-load applications like proxy servers, firewalls, multi-scanning and encryption engines.

Another major advantage for this platform evolution is the adoption of both DDR4 and DDR3L. Both memory specifications offer lower power consumptions than previous generations. Indeed, power efficiency is extremely important as streaming video through network traffic usually consumes high power.

Benchmark Results Based on Lanner NCA-4210

Lanner has conducted benchmark tests for Intel® Core™ i3-6100TE Processor (4M Cache, 2.70 GHz) and Intel® Core™ i7-6700TE Processor (8M Cache, up to 3.40 GHz) based on our network appliance NCA-4210. The following will provide benchmark results about our tests.

Test Platform

Tested Product	NCA-4210B
CPU	Intel® Core™ i3-6100TE Processor (4M Cache, 2.70 GHz), Intel® Core™ i7-6700TE Processor (8M Cache, up to 3.40 GHz)
DRAM	Transcend DDR4 16G 2133 ECC X2
Benchmark tool	CPU Mark V2.1
IPMI card	IAC-AST2302
Storage	WD WD20NPVX 2TB/SATA3/8MB
Operating system	Windows 8.1 Professional 64bit
Power supply	FSP FSP220-50LH 220W

CPU Configurations

Configuration 1 – NCA-4210 with Intel® Core™ i3-6100TE Processor

Processor	Intel® Core™ i3-6100TE Processor
CPU speed	2.70 GHz
Bus speed	100 MHz
Bus/Core Ratio	27
L2 Cache	512KB
L3 Cache	4MB
CPU score	2C4T
Package	LGA1151
Manufacturing process	14nm
Thermal design power (TDP)	35W

Configuration 2 – NCA-4210 with Intel® Core™ i7-6700TE Processor

Processor	Intel® Core™ i7-6700TE Processor
CPU speed	2.40 GHz
Bus speed	100 MHz
Bus/Core Ratio	24
L2 Cache	1MB
L3 Cache	8MB
CPU score	4C8T
Package	LGA1151
Manufacturing process	14nm
Thermal design power (TDP)	35W

Configuration 3 – NCA-4210 with Intel® Core™ i7-6700 Processor

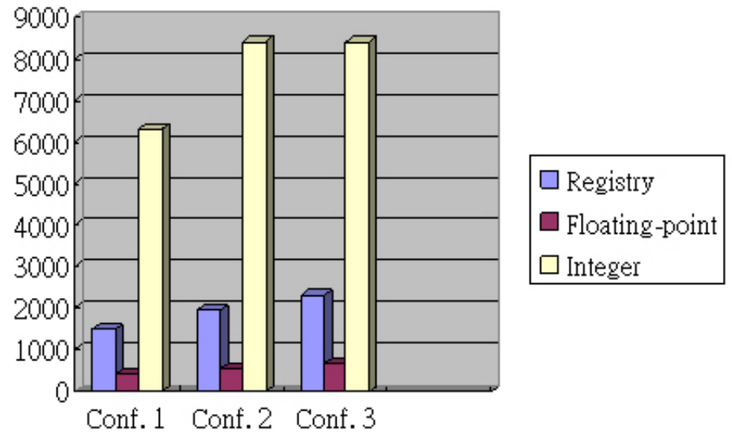
Processor	Intel® Core™ i7-6700 Processor
CPU speed	3.40 GHz
Bus speed	100 MHz
Bus/Core Ratio	34
L2 Cache	1MB
L3 Cache	8MB
CPU score	4C8T
Package	LGA1151
Manufacturing process	14nm
Thermal design power (TDP)	35W

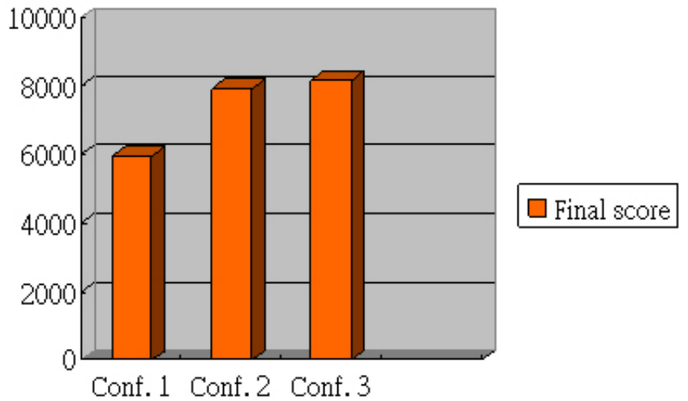
CPU Mark 2.1 Score

Lanner has conducted CPU Mark 2.1 Score tests based on the three CPU configurations and the test platform mentioned above. The results are shown in the following tables and graphs.

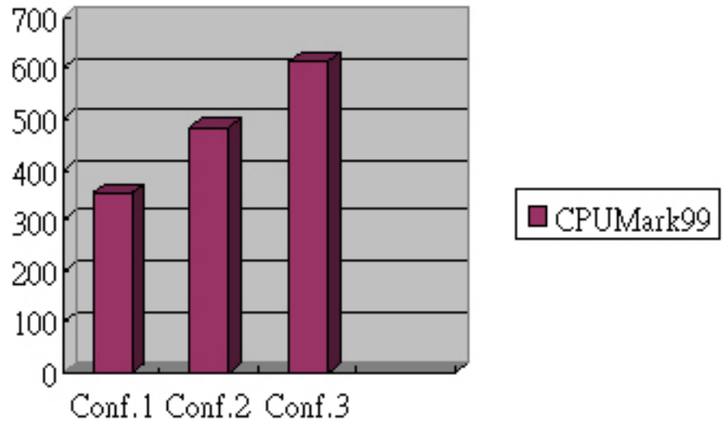
Configuration	Registry	Floating-point	Integer	Final Score*
1	1482.9	400.2	6302.5	5955.3
2	1939.2	525.2	8403.4	7918.6
3	2291.8	646.4	8403.4	8156.5

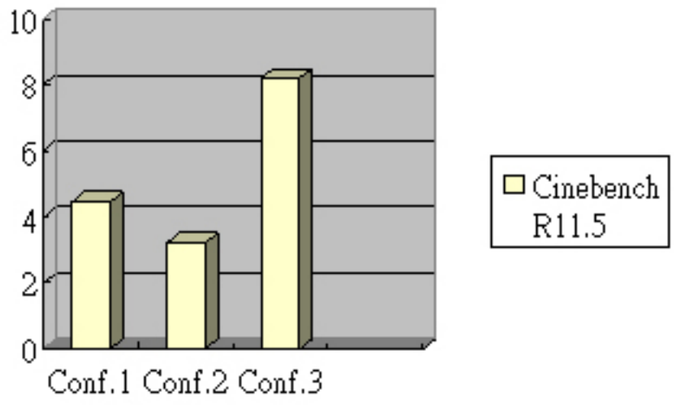
*Final score = 40% Score of Registry score + 80% Score of Floating-point + 80% Score of Integer score. The calculations are set to evaluate the performance in data processing with regards of registry operations, floating-point operations and integer operations within the architecture.





Configuration	CPUMark99	Cinebench R11.5
1	354	4.43 pts
2	484	3.21 pts
3	612	8.20 pts





Ethernet Throughput Benchmark

Test Environment

BIOS version	NCA-4210B Ver.T08
CPU	Intel® Core™ i7-6700TE Processor (8M Cache, up to 3.40 GHz)
DRAM	Transcend DDR4 8G 2133 ECC X2
Traffic Generator	XM12
IPMI card	IAC-AST2302
Storage	WD WD20NPVX 2TB/SATA3/8MB
Operating system	Linux Testbed
Kernel	2.6.35.11

Test Setting

Test Mode: throughput %

- Application: IXIA Automate 7.40.132.5GA-SP3 (IXIA XM12)
- Test mode: Throughput %
- IP version: IPv4
- Pattern: Backbone (Pair)
- Direction: A < - >B
- Protocol: IP
- Frame size: 64, 128, 256, 512, 1024, 1280, and1518 bytes
- Duration: 30 Seconds
- Loss Tolerance: 0%
- Resolution: 0.01%
- Benchmark(Mb/s) = ((Throughput / 100) * 1000(GigaLAN)) * 2 (Bi-Direction)

NCA-4210 with NIC module NCS2-IXM407 LAN Port Allocations

NCA-4210 System			NCS2-IXM407 NIC Module
LAN 5 -7	LAN 1, 7, 8	LAN 3, 4	LAN 1 - 4
eth 4 - 6	eth 0, 1, 7	eth 2, 3	
LAN 9 - 11	LAN 12 - 14	LAN 15, 16	eth 16 - 19
eth 8 - 10	eth 11 - 13	eth 14, 15	

Ethernet Throughput Test Results

Frame Size / Type	64	128	256	512	1024	1280	1518
	Throughput %						
1 pair	Protocol: IP / Cable length: 1.8m						
LAN 1 to LAN 2	75.00	100.00	100.00	100.00	100.00	100.00	100.00
2 pair							
LAN 1 to LAN 4	73.07	100.00	100.00	100.00	100.00	100.00	100.00
LAN 9 to LAN 12	73.06	100.00	100.00	100.00	100.00	100.00	100.00
4 pair							
LAN 1 to LAN 8	68.85	100.00	100.00	100.00	100.00	100.00	100.00
LAN 9 to LAN 16	73.06	100.00	100.00	100.00	100.00	100.00	100.00
8 pair							
LAN 1 to LAN 16	39.62	59.20	84.15	100.00	100.00	100.00	100.00

About Lanner Electronics Inc.

Founded in 1986 and publicly listed (TAIEX 6245) since 2003, Lanner Electronics, Inc. is an ISO 9001 certified designer and manufacturer of network application platforms, network video platforms and applied computing hardware for first-tier companies. Lanner's expertise also extends to include driver and firmware support, enabling customers to optimize hardware and software communication to achieve faster time to market. With headquarters in Taipei, Taiwan and branches in the U.S. and China, Lanner is uniquely positioned to deliver custom technical solutions with localized, value-added service.

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