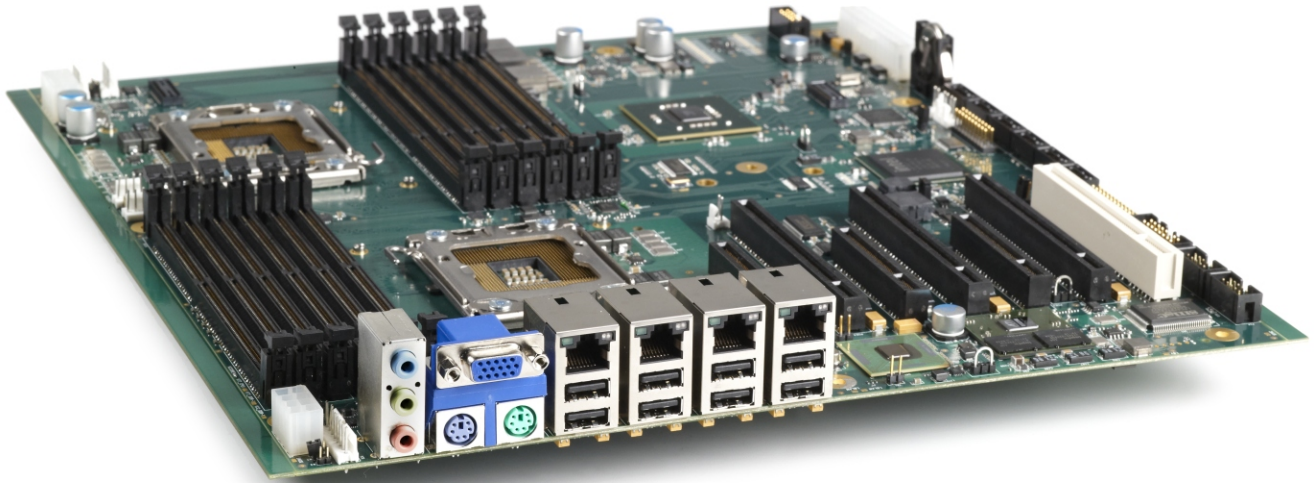# NTM6900

NTM6900 MOTHERBOARD WITH QUAD-CORE PROCESSORS

Trenton's NTM6900 is designed and built in the U. S. to deliver system performance and longevity in embedded applications worldwide. The motherboard features extended-life, quad-core processors based on the Nehalem-EP core. Here are some highlights of the Trenton NTM6900 embedded motherboard:

- ✓ **Quad-Core, Intel® Xeon® Series 5500 Processors**
- ✓ **Twelve, DDR3 DIMM slots (144GB max.)**
- ✓ **Trusted Computing support via TPM 1.2**
- ✓ **One x4 PCI Express Gen 1.1 card slot (electrical)**
- ✓ **Ten USB 2.0 interfaces**
- ✓ **Graphic Processing Unit (GPU)**
- ✓ **Audio Port**
- ✓ **Intel® TurboBoost**

- ✓ **Intel® 5520 Chipset with the Intel® ICH10R**
- ✓ **SSI-EEB Form Factor (12.0"/30.5cm x 13.0"/33.0cm)**
- ✓ **Three x8 PCI Express® Gen 2 card slots (electrical)**
- ✓ **One 32-bit/33MHz PCI card slot**
- ✓ **Six SATA II 300 ports with locking connectors**
- ✓ **PS/2 Mouse/Keyboard port**
- ✓ **Serial communication interfaces**
- ✓ **Intel® Hyper-Threading Technology**

- ✓ **Six, dual-channel DDR3-1333 memory interfaces**
- ✓ **SSI-EEB Enterprise Electronics Bay Specification 2008**
- ✓ **Two x4 PCI Express Gen 2 card slots (electrical)**
- ✓ **Four 10/100/1000Base-T Ethernet ports**
- ✓ **On-board SATA RAID support**
- ✓ **Video Port**
- ✓ **Intel® QuickPath Interconnect**
- ✓ **Intel® VT and Intel® VT-d**

PROCESSORS:

Quad-Core Intel® Xeon® Processors (5500 series), 1.86GHz - 2.53GHz*
Processor Package: LGA 1366 socket

Higher speeds as available

The Intel® 5520 chipset and each Intel® Xeon® E5500 series processor on the NTM6900 supports the Intel® QuickPath Interconnect (QPI). The interface speed of an Intel® QPI is determined by the specific processor and is measured in Giga Transfers per second (GT/s). GT/s refers the how quickly data packets are transferred from a processor to the chipset or from processor-to-processor. The Intel® QPI enables the sharing of computing resources between processors and faster processor to chipset communications. Other processor features include:

- Quad-Core, 8MB Shared Last-Level Cache (LLC)
- Intel® Hyper-Threading enables 8 threads per processor
- 256K Mid-Level Cache plus 32K of L1 instruction and data caches per core
- Integrated Memory Controller (IMC) built into the processor for direct system memory connections
- Three, dual-channel DDR3 1333MHz memory interfaces per processor

CHIPSET:

Combining the Intel® 5520 Input Output Hub (IOH) with the Intel® ICH10R delivers chipset performance and functionality well suited for challenging embedded computing applications. Processor to IOH speeds of 4.8GT/s, 5.86GT/s and 6.4GT/s are supported and IOH to ICH10R communications are supported via the Controller Link (Clink) and the Enterprise Southbridge Interface (ESI). ESI features a x4 PCI Express® link with a transfer rate of 2.5Gbps between the IOH and the ICH10R. Many advanced I/O capabilities are built into this chipset combination including SATA RAID array support and direct option card slot interface capabilities that include PCI Express Gen 2, PCI Express Gen 1.1 and 32-bit/33MHz PCI.

DDR3-1333 MEMORY:

Each processor on the NTM6900 features three, dual channel DDR3-1333 system memory interface connections directly to six DIMM sockets for a total of twelve DDR3 DIMMs supported on the motherboard. PC3-10600, PC3-8500 or PC3-6400 DIMMs that are ECC registered, 72-bit, 240-pin gold-plated may be used. 144GB is the maximum memory capacity supported; however, memory market realities point to a practical maximum of 96GB.

OPTION CARD SLOTS:

A total of seven option card slots are supported on the Trenton NTM6900 motherboard.

- Three x16 PCI Express (PCIe)mechanical slots driven with x8 PCIe Gen 2 electrical links
- Two x8 PCIe mechanical slots driven with x4 PCIe Gen 2 links
- One x8 PCIe mechanical slot driven with a x4 PCIe Gen 1.1 link
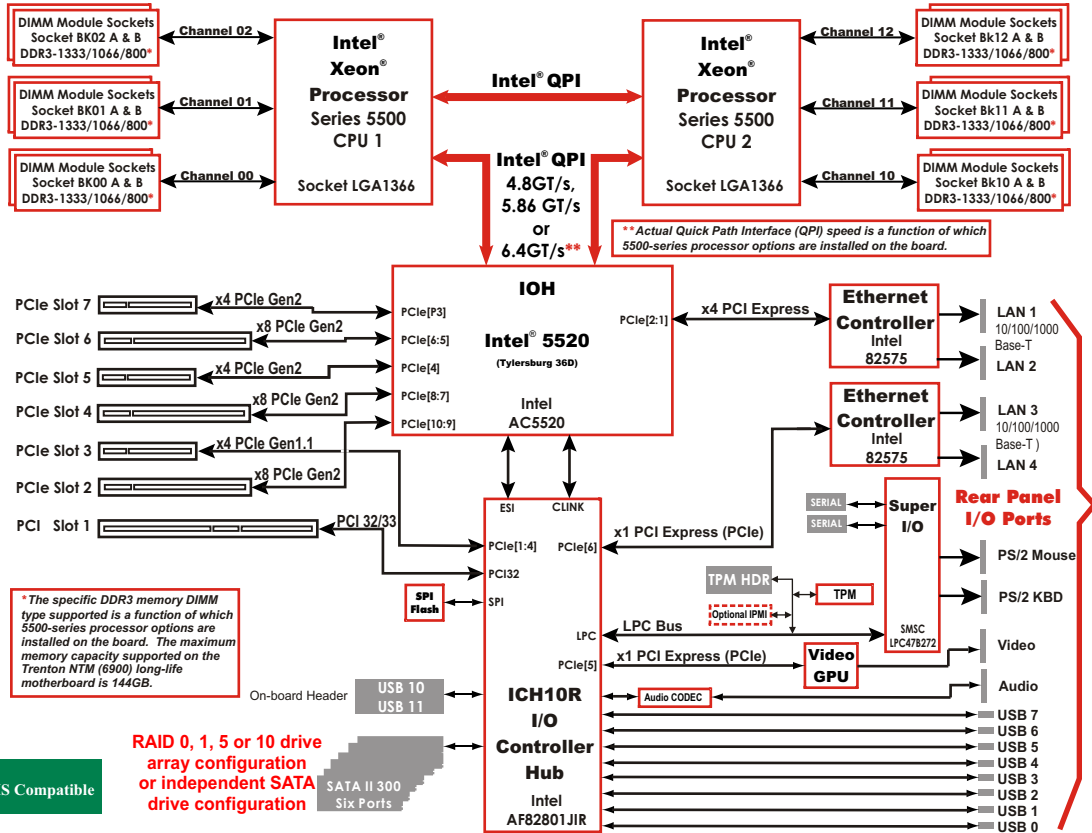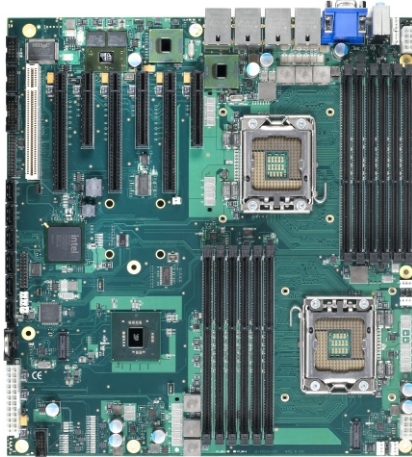- One 32-bit/33MHz PCI slot

STANDARDS:

- PCI Express® Base Specification 1.1 and 2.0
- PCI Local Bus Specification 2.3
- IEEE P996, Personal Computer Bus Standard
- SSI-EEB 2008 - Rev 1.0 (Extended ATX form factor std.)

TRENTON
Dependable, always.

DIMM Module Sockets Socket BK02 A & B DDR3-1333/1066/800* — Channel 02

DIMM Module Sockets Socket BK01 A & B DDR3-1333/1066/800* — Channel 01

DIMM Module Sockets Socket BK00 A & B DDR3-1333/1066/800* — Channel 00

Intel® Xeon® Processor Series 5500 CPU 1 — Socket LGA1366

Intel® QPI

Intel® Xeon® Processor Series 5500 CPU 2 — Socket LGA1366

Channel 12 — DIMM Module Sockets Socket Bk12 A & B DDR3-1333/1066/800*

Channel 11 — DIMM Module Sockets Socket Bk11 A & B DDR3-1333/1066/800*

Channel 10 — DIMM Module Sockets Socket Bk10 A & B DDR3-1333/1066/800*

Intel® QPI 4.8GT/s, 5.86 GT/s or 6.4GT/s**

**Actual Quick Path Interface (QPI) speed is a function of which 5500-series processor options are installed on the board.

IOH Intel® 5520 (Tylersburg 36D)   Intel AC5520

PCIe Slot 7 — x4 PCIe Gen2 — PCIe[P3]
PCIe Slot 6 — x8 PCIe Gen2 — PCIe[6:5]
PCIe Slot 5 — x4 PCIe Gen2 — PCIe[4]
PCIe Slot 4 — x8 PCIe Gen2 — PCIe[8:7]
PCIe Slot 3 — x4 PCIe Gen1.1 — PCIe[10:9]
PCIe Slot 2 — x8 PCIe Gen2
PCI Slot 1 — PCI 32/33

PCIe[2:1] — x4 PCI Express — **Ethernet Controller Intel 82575** — LAN 1 10/100/1000 Base-T / LAN 2

Ethernet Controller Intel 82575 — LAN 3 10/100/1000 Base-T) / LAN 4

Rear Panel I/O Ports

ESI / CLINK
PCIe[1:4] / PCIe[6] — x1 PCI Express (PCIe)
PCI32
SPI

SPI Flash

* The specific DDR3 memory DIMM type supported is a function of which 5500-series processor options are installed on the board. The maximum memory capacity supported on the Trenton NTM (6900) long-life motherboard is 144GB.

On-board Header — USB 10 / USB 11

SERIAL / SERIAL — **Super I/O** — PS/2 Mouse / PS/2 KBD

TPM HDR — TPM
iOptional IPMI

LPC Bus — LPC
PCIe[5] — x1 PCI Express (PCIe)

SMSC LPC47B272 — Video / Audio

Video GPU

Audio CODEC

ICH10R I/O Controller Hub Intel AF82801JIR

USB 7 / USB 6 / USB 5 / USB 4 / USB 3 / USB 2 / USB 1 / USB 0

RAID 0, 1, 5 or 10 drive array configuration or independent SATA drive configuration — SATA II 300 Six Ports

FOUR ETHERNET INTERFACES - 10/100/1000BASE-T:

The NTM6900 features Ethernet connectivity that supports four Gigabit Ethernet ports on the board's rear panel I/O plate. RJ-45 connectors on the I/O plate provide the mechanical interface to these Ethernet networks.

VIDEO INTERFACE - GRAPHIC PROCESSING UNIT (GPU):

The NTM6900's GPU uses 8MB of integrated video memory to support the motherboard's standard VGA video display port.

SERIAL ATA/300 PORTS:

The integrated Serial ATA (SATA) controller inside the ICH10R provides six SATA II 300 ports with data transfer rates up to 300MB/s. Independent SATA drive operation and RAID 0, 1, 5 and 10 drive array configurations are supported. SATA technology provides lower pin counts, reduced signaling voltages, simplified cabling, CRC error detection and hot-plug device support.

UNIVERSAL SERIAL BUS INTERFACES (USB 2.0):

There are a total of ten available USB 2.0 interfaces on the motherboard. USB ports 0 though 7 are located on the I/O plate and on-board headers contain ports 10 and 11.

BIOS (FLASH):

The NTM6900 uses AMIBIOS8® located in the motherboard's SPI flash devices. AMIBIOS8 contains features such as:

- Support for flash devices for BIOS upgrading
- Integrated support for USB mass storage devices such as USB, DVD-RW, CD-ROM, CD-RW, etc.
- Boot from network, USB mass storage devices, IDE or ATAPI
- Serial port console redirection to support headless operation

NTM6900 APPLICATION CONSIDERATIONS:

Power Requirements:

Typical Values - 100% Stress State with 12GB of system memory

CPU	Intel® No.	+5V	+12V	+3.3V
2.53GHz	E5540	4.60A	12.79A	1.92A
2.0GHz	E5504	4.42A	11.67A	1.91A

Typical Values - Static Desktop (Idle) with 12GB of system memory

CPU	Intel® No.	+5V	+12V	+3.3V
2.53GHz	E5540	4.59A	7.87A	1.87A
2.0GHz	E5504	4.41A	8.04A	1.93A

-12V @ <100mA
Tolerance for all voltages is +/- 5%
All processors are quad-core CPUs
Trenton recommends an EPS-style power supply for use with the NTM6900. Dual +12V power connectors are provided on the motherboard and must be used when using dual Intel® Xeon® Series 5500 processors and a large number of DIMMs.

Temperature/Environment:

Operating Temperature: 0° to 50° C.
Air Flow Requirement: 350LFM continuous airflow
Storage Temperature: - 40° to 70° C.
Humidity: 5% to 90% non-condensing

Mechanical:

The Extended ATX form factor of the NTM6900 complies with the SSI-EEB 2008 - Rev 1.0 industry standard for overall board dimensions [12.0" (30.5cm) x 13.0" (33.1cm)] and mounting hole placements. The standard height cooling solution is designed for 2U and greater chassis heights. Contact Trenton if your system design requires a lower profile cooling solution.

ADDITIONAL PRODUCT FEATURES:

I/O Features:
- Audio and video ports (I/O plate)
- PS/2 mouse and keyboard connector (I/O plate)
- Two high-speed serial ports (on-board header)

Security & Diagnostic Features:
- TPM 1.2 Trusted Computing capability
- Fan control, polling for health and status LED interfaces
- Optional IPMI support (on-board header)

ORDERING INFORMATION:

Model #	CPU Speed	Intel® No.	Embedded CPU
	Model Name: NTM6900		
506900-211-0G	2.53GHz	E5540	Yes
506900-106-0G	2.0GHz	E5504	Yes
506900-407-0G	2.13GHz	L5518	Yes
	(0G = Memory)		

AGENCY APPROVALS:

Designed for UL60950, CAN/CSA C22.2 No. 60950-00, EN55022:1998 Class B, EN61000-4-2:1995, EN61000-4-3:1997, EN61000-4-4:1995, EN61000-4-5:1995, EN61000-4-6:1996, EN61000-4-11:1994

The stated bus speed, memory and communication interface speeds are component maximums; actual system performance may vary.

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TRENTON Dependable, always.

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