

Feature Overview

DATA SHEET

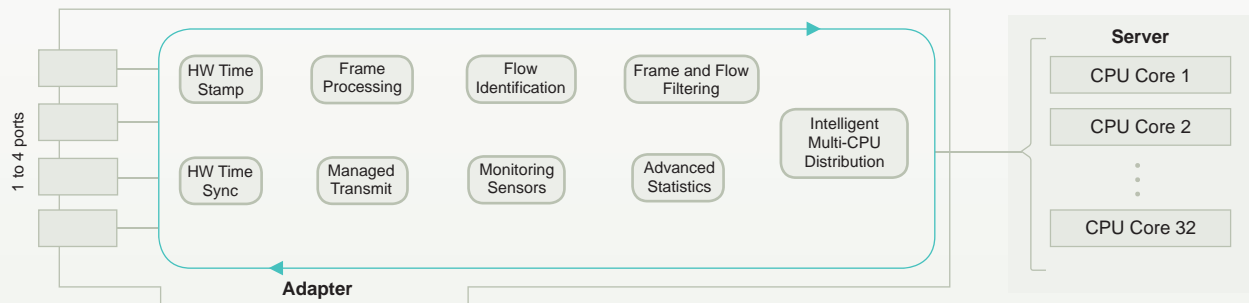
Plug-and-Play Intelligent Acceleration

The Napatech intelligent network adapter family supports a common feature set and driver software architecture allowing plug-and-play support for any network adapter combination.

The intelligent feature set off-loads processing and analysis of Ethernet data from application software while ensuring optimal use of the standard server's resources leading to effective application acceleration.



NT20E2 and NT40E2-1



Feature Categories

Hardware Time Stamp

- High-precision 10 ns time-stamping

Hardware Time Synchronization

- GPS, CDMA and IEEE1588 time synchronization

Frame Processing

- Multi-port data merge
- Frame buffering
- Frame classification
- Frame and protocol information
- Fixed, dynamic and conditional slicing
- Deduplication
- Ethernet FCS and IP/UDP/TCP checksum

Flow Identification

- Flow identification based on hash keys
- Multiple protocol-specific hash keys
- Dynamic hash key selection

Frame and Flow Filtering

- Configurable filters
- Coloring/tagging

Intelligent Multi-CPU Distribution

- Configurable data distribution

Advanced Statistics

- RMON1 port statistics
- Advanced statistics

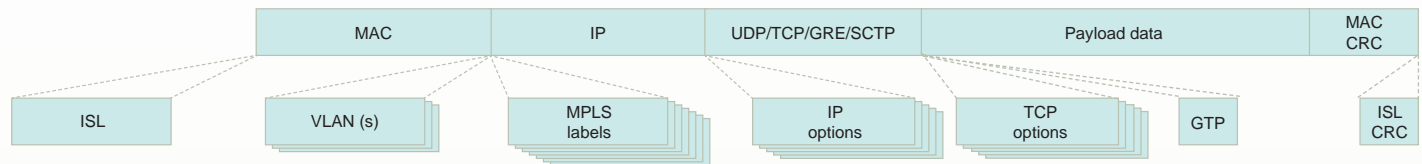
Monitoring Sensors

- Temperature and power sensors

Managed Transmit

- One-touch frame transmit decision
- Synchronized transmit
- Inter-Frame Gap (IFG) control
- Ethernet FCS and IP/UDP/TCP checksum generation

Feature Descriptions



The Napatech adapters decode all frames regardless of encapsulations.

HW Time Stamp

High-precision time-stamping with 10 ns resolution is applied to all frames received by the adapter. The adapter also supports insertion of a high-precision 64-bit time stamp in frames being transmitted. The time stamp is inserted at a user-defined offset.

Support is provided for 6 different 64-bit time-stamping formats:

- Native free-running format with 10 ns resolution
- 2 Windows formats with 10 ns or 100 ns resolution
- Native UNIX format with 10 ns resolution
- 2 PCAP formats with 1 ns or 1000 ns resolution

HW Time Synchronization

The adapter time-stamping can be synchronized to that of another adapter or to external sources:

- Synchronization via the Napatech Time Synchronization Unit e.g. to a GPS signal via Trimble Acutime Gold GPS antenna
- Adapter-to-adapter HW time synchronization either internally, externally or using daisy-chaining of adapters
- OS time synchronization with dynamic drift adjustment
- Free-running time synchronization
- Synchronization relative to any external PPS time source
- Synchronization to UTC time from:
 - CDMA time reference when connected to EndRun Præcis Cf CDMA receiver
 - IEEE1588/PTP time reference when connected to Oregano SYN1588 PCIe NIC
 - Symmetricom synchronization server via Sysplex interface

Frame Processing

Multi-Port Data Merge

For network adapters with multiple ports, it is possible to merge data received on multiple ports into a single data stream for further processing. This is useful for analyzing both receive and transmit directions of a connection, where the data from the receive and transmit directions are received on separate ports.

Frame Buffering

Onboard network adapter memory buffers allow frames to be buffered during micro-burst or PCI Express bus congestion situations.

Frame Classification

The network adapter frame decoder ensures protocol recognition of all major layer 2 to 4 protocols. This is a unique advantage over any other network adapter. It provides offset information for assisting the customer application under all circumstances in a mixed-traffic environment.

Frame classification information can be used for:

- Finding protocol headers and payload data at dynamic locations
- Advanced filtering
- 17 different hash keys
- Dynamic selection of hash keys (per frame)
- Dynamic slicing
- Multi-CPU buffer splitting

Frame and Protocol Information

For each Ethernet frame received, frame and protocol information is made available to the host application. This accelerates processing of each frame. Information available includes:

- High-precision time-stamp information
- Protocol information: IPv4, IPv6, UDP, TCP, GRE, SCTP and GTP
- Encapsulation information: ISL, VLAN and MPLS
- Hash key information: hash key value and type
- Offsets to start of L3, L4 and L5 payload
- Coloring/tagging: Tags defined by filters
- Checksum error flags: Ethernet, IP, TCP, UDP

Fixed, Dynamic and Conditional Slicing

- Fixed slicing: Truncation of frames to a maximum size
- Dynamic slicing: Truncation of frames to a dynamic size relative to a specified protocol, e.g. IP payload + 16 bytes
- Conditional slicing: Fixed or dynamic slicing with properties based on frame decoding

Deduplication

When network traffic is analyzed, large amounts of duplicate frames are sometimes received. Napatech network adapters have hardware functionality that can recognize and remove duplicate frames. This saves a substantial amount of server CPU cycles. The deduplication functionality can be configured to detect and remove 98% of duplicate frames in typical situations.

Feature Descriptions

Ethernet FCS and IP/UDP/TCP Checksum

For each received frame, the Ethernet Frame Check Sequence (FCS) is checked, as well as the checksum information in IP, UDP and TCP headers. For in-line applications, the FCS and checksum can be re-used or re-generated as required.

Flow Identification

Flow Identification Based On Hash Keys

Frame classification information is used to calculate a hash key for each frame received. Frames with the same hash key can be treated as a flow and be processed accordingly.

Multiple Protocol-Specific Hash Keys

Hash key calculation is based on combinations of specific header data. Napatech supports up to 17 different hash key types based on the type of protocols encapsulated in the Ethernet frame. For example, the GTP hash key type uses information from the IP and GTP headers in the Ethernet frame. Protocol-specific hash keys allows flows to be established based on the type of protocol to be analyzed.

Dynamic Hash Key Selection

Since hash key types are protocol-specific, the network adapter can dynamically select the correct hash key type for calculation based on the information provided by frame classification.

Frame and Flow Filtering

Configurable Filters

64 advanced programmable filters are available with an exceptional flexibility in the way they are specified, combined and controlled. They are configured by means of the easy-to-use Napatech Programming Language (NTPL). The customer application can change the filters on the fly.

The programmable filter logic is built on top of the advanced protocol decoding capabilities. This ensures that the application always gets the packets matching the requested protocol, even under very diverse conditions. Using a single filter, the adapter can capture, for instance, all TCP/IP packets with a specific source IP address, even when these packets are ISL-, VLAN- or MPLS-encapsulated and/or contain IP/TCP options.

In all, a single filter will give the correct output under 7744 different traffic conditions. Napatech network adapters have 64 programmable filter blocks, which can be combined in various ways.

Coloring/Tagging

Filtered frames can be tagged with a "color" ID identifying the filter that forwarded the frame. This tag can be used to optimize applications performing different processing for different frame types.

Intelligent Multi-CPU Distribution

Multi-CPU buffer splitting enables network adapters to place captured frames in 1 to 32 host buffers. The customer can configure the size of the host buffers from 16 MB to 128 GB; and how data is placed in the host buffers, based on results from the filter logic (IP address range and protocols), port numbers and/or generated hash key values (flows).

The advanced multi-CPU buffer splitting functionality and the option for distributing traffic to 1 to 32 CPU cores significantly improves the CPU cache performance, by always delivering the same flows and frame types to the same CPUs.

Advanced Statistics

RMON1 Port Statistics

Napatech network adapters provide RMON1 (RFC2819) counters on a per-port basis.

Advanced Port Statistics

In addition to RMON1 port statistics, the network adapter hardware generates an extensive amount of additional statistics counters, which are available independently of whether the traffic is forwarded to the host or not. This enables customer applications to retrieve a comprehensive network traffic analysis at virtually zero CPU load.

Two types of statistics counters are available:

- Large sets: RMON1 (RFC2819) counters with extension of jumbo frame counters are available for both captured and discarded frames on a per-port basis.
- Normal sets: Frame and byte counters for good and bad frames are available per filter and per host buffer.

Counter sets are always delivered as a consistent snapshot time-stamped by a 64-bit high-precision clock.

Monitoring Sensors

Sensors on the adapters provide extensive monitoring of:

- PCB temperature level with alarm
- FPGA temperature level with alarm and automatic shutdown
- Temperature of critical components
- Individual optical port temperature or light level with alarm
- Voltage or current overrange with alarm
- Cooling fan speed with alarm
- Ethernet link status per port
- Status and loss of time synchronization

The system status can be read from the LEDs on the front of the adapter. Possible alarms and error codes are stored on the adapter for later troubleshooting.

Feature Descriptions

Managed Transmit

One-Touch Frame Transmit Decision

Received frames can be quickly and easily transmitted using a single command. A transmission indicator can be set to either transmit the frame immediately or using the received timing.

Synchronized Transmit

Transmission or replay is controlled by transmission clocks. Synchronized and coordinated transmission is therefore possible across multiple ports and adapters when their time stamp clocks are synchronized. This is ideal for traffic generation and capture replay applications.

Inter-Frame Gap (IFG) Control

For transmitted frames, the timing of transmission can be controlled by adjusting the IFG. Frames can be transmitted with the original IFG or the IFG can be adjusted higher or lower as required.

Ethernet FCS and IP/UDP/TCP Checksum Generation

For each transmitted frame, the Ethernet Frame Check Sequence (FCS) and checksum information in IP, UDP and TCP headers can be generated automatically by the network adapter.

Network Adapter Feature Support

Feature	NT40E2-1	NT40E2-4		NT20E2		NT20E		NT4E		NT4E-STD	
	Capture	Capture	In-Line	Capture	In-Line	Capture	In-Line	Capture	In-Line	Capture	In-Line
HW Time Stamp	X	X	X	X	X	X	X	X	X	X	X
HW Time Sync	X	X	X	X	X	X	X	X	X		
Frame Processing	X	X	X	X	X	X	X	X	X		
Slicing	X	X	X	X	X	X		X		Fixed slicing only	
Deduplication	X	X		X		X		X			
Flow Identification	X	X	X	X	X	X	X	X	X		
Frame and Flow Filtering	X	X	X	X	X	X	X	X	X		
Intelligent Multi-CPU Distribution	X	X	X	X	X	X	X	X	X	Port number only	Port number only
RMON1 Port Statistics	X	X	X	X	X	X	X	X	X	X	X
Advanced Statistics	X	X	X	X	X	X	X	X	X		
Monitoring Sensors	X	X	X	X	X	X	X	X	X	X	X
Managed Transmit	X	X	X	X	X		X		X		X
Synchronized Transmit	X	X	X	X	X						
FCS and Checksum Generation	X	X	X	X	X				X		

Company Profile

Napatech develops and markets the world's most advanced programmable network adapters for network traffic analysis and application off-loading. Napatech is the leading OEM supplier of Ethernet network acceleration adapter hardware. Napatech is fully focused on providing the most cost-effective hardware acceleration solutions for Gigabit Ethernet connectivity, increasing our customers' ability to keep their competitive advantage, while maintaining the flexibility and cost position of standard server equipment and operating systems.

Napatech provides unmatched value-add to our OEM customers by offering a very flexible feature set and a highly scalable range of network adapters. With easy-to-use APIs, Napatech adapters enable effective integration of Network Monitoring, Network Security, Network Test and Measurement, and Network Optimization appliances. Napatech has a strong international focus supporting OEM customers worldwide.

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