

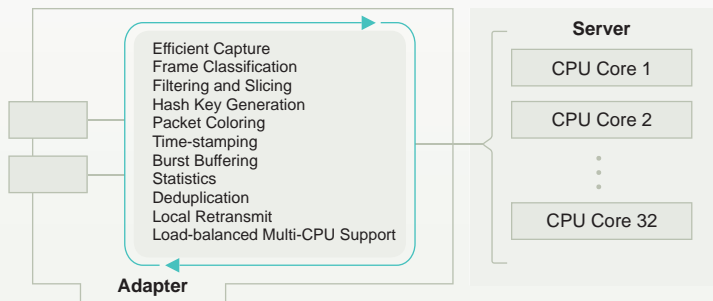
NT20E CAPTURE

Intelligent Real-time Network Adapters 2-port 10 G Ethernet PCIe

DATA SHEET

Hardware Acceleration

The NT20E Capture Adapters provide deep packet inspection (DPI), flow analysis and protocol processing capabilities that can accelerate network applications and off-load the server CPU by taking care of layer 2 to 4 network traffic analysis. This enables OEM customers to build or upgrade their products to become high-performing full-line-rate 20 Gbps network monitoring/analysis systems by using the NT20E Capture Adapter and a standard Linux, FreeBSD or Windows server.



FEATURE HIGHLIGHTS AND APPLICATIONS

Feature Highlights

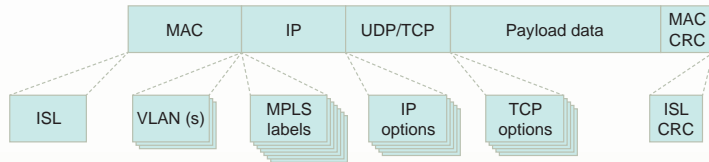
- 2 x 10 Gbps connections
- Full-duplex monitoring
- Full-line-rate capture and processing for all frame sizes
- Efficient capture: < 1% host CPU load
- High-precision 10 ns time-stamping
- Advanced hardware time synchronization
- 1.2 sec. of on-board data burst buffering
- 20 Gbps frame processing including protocol decoding, programmable filters, conditional slicing, hash keys, buffering, advanced statistics, deduplication and multi-CPU support
- Local retransmit at full line rate
- On-the-fly fully reconfigurable setup
- Easy-to-integrate API
- LibPCAP support
- Linux, FreeBSD and Windows support

Napatech-supported Applications

The Napatech Capture Adapters enable our OEM customers to build cost-effective and value-added appliances to meet requirements for many different solutions. Examples of supported applications are:

- Advanced Frame Analysis and Statistics
- Packet Jitter and Latency Analysis
- Flow Analysis of any IP end-to-end traffic
- Data Recording of network traffic
- Data Retention, Logging and Forensic Analysis
- Lawful Intercept
- Intrusion Detection
- Network QoS Assurance for media streams
- Transaction Performance Analysis
- Load Distribution between servers

FEATURES



The Napatech adapters decode all frames regardless of encapsulations.

Layer 4 Protocols TCP, UDP and ICMP
Layer 3 Protocols IPv4, IPv6, IPX and ARP
Layer 2 Protocols Ethernet II, LLC, SNAP and RAW

Protocols supported by the NT20E frame decoder.

Frame Classification

The NT20E 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 is the foundation for the adapter to implement these advanced features:

- Finding protocol headers and payload data at dynamic locations
- Advanced filtering
- 2-tuple and 5-tuple hash key generation (sorted/unordered)
- Dynamic slicing
- Multi-CPU buffer splitting

The frame classification information can be provided to the customer application to accelerate the frame processing.

Packet Descriptors

Captured frames are appended with a standard PCAP packet descriptor. This can be augmented with additional information such as CRC error flags. Extended packet descriptors are also available with information, such as:

- Protocol information: IPv4, IPv6, UDP, TCP etc.
- Encapsulation information: ISL, VLAN and MPLS
- Hash key information: 2- or 5-tuple hash keys
- Offsets to information: Start of IP header, UDP/TCP header and UDP/TCP payload
- Coloring/tagging: Tags defined by filters

Efficient Data Capture

The 2 ports on the NT20E adapters enable full-duplex monitoring of a network link (Rx and Tx traffic). The frame merging functionality enables Rx and Tx frames to be merged in reception time order simplifying the application processing.

Buffering

On-board memory enables 1.2 sec. of data burst buffering even on a fully loaded 2 x 10 Gbps network.

Filtering

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. The customer application can change the filters on the fly without data loss.

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. NT20E has 64 such programmable filter blocks, which can be combined in various ways.

Filtering can be based on various combinations of:

- Bit patterns
- Protocol information
- Frame size tests
- Frame error tests
- Port number
-

Slicing

Three slicing methods are supported:

- 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

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.

FEATURES

Time-stamping and Synchronization

High-precision time-stamping with 10 ns resolution is applied to all frames received by the adapter. 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
- 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

NT20E supports 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 10 ns or 1000 ns resolution

Statistics

The adapter hardware generates an extensive amount of statistics counters, which are available independently on 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.

Local Retransmit

Local retransmit redirects network traffic on the adapter itself without transferring it to the host. Local retransmit can be applied to all or parts of the incoming traffic using filters to retransmit packets of a specific protocol or a specific IP address etc., e.g. for load distribution between servers.

NTPL Example

```
HashMode = Hash5TupleSorted
Capture[Priority=1; Feed=0; SliceOffset = 32; SliceAddHeader
  = Layer2And3And4HeaderSize] = Protocol == UDP
Capture[Priority=1; Feed=1,2; SliceOffset = 64;
  SliceAddHeader = Layer2And3And4HeaderSize]
  = Protocol == TCP
Capture[Priority=0; Feed=3..7] = mTcpSrcPort == mTcpPort_HTTP
Deduplication[DynOffset = Layer2HeaderSize; Timeout = 50]
  = Channel == 0,1
```

Deduplication

When network traffic is analyzed, large amounts of duplicate frames are sometimes received. NT20E has 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.

Multi-CPU Support

Multi-CPU buffer splitting enables the NT20E adapters to place captured frames in 1 – 32 host buffers. The customer can configure the size of the host buffers from 1 MB to 128 GB; and how data are 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 – 32 CPU cores significantly improves the CPU cache performance, by always delivering the same flows and frame types to the same CPUs.

Software

The network adapter drivers support Linux, FreeBSD and Windows.

The API is identical for all Napatech adapters. The adapters also support LibPCAP.

NTPL (Napatech Programming Language) provides a simple and intuitive interface for programming the advanced features of the NT20E adapters. Napatech also provides a command line tool that enables fast prototyping of the adapter programming.

A large set of useful SDK tools are included in source code. These tools can be used for debugging and prototyping but also as examples of how the adapters are used. Application examples illustrating how to capture data to memory or disk, and how to generate netflow data, are also included.

This NTPL example shows how to set up the adapter to capture UDP, TCP and HTTP frames to 8 different host buffers (feeds). If more than one buffer is specified in a capture command, the frames are distributed between the buffers based on a 5-tuple hash key generated by the adapter. Furthermore UDP and TCP frames are sliced to two different sizes. Finally the adapter is set up to remove duplicate frames on ports 0 and 1, if the frames are less than 50 ms apart, and the layer 2 parts of the frames are identical (MAC addresses and encapsulations are excluded from the compare). All of the functionality included in the example is performed at line speed by the adapter hardware at zero server CPU load.

SPECIFICATIONS

General Features

- Full-line-rate processing for all frames from 64 bytes to 10.000 bytes
- IEEE standard: IEEE 802.3 10 Gigabit Ethernet
- Physical interface: 2 XFP ports
- Supported XFP modules: Multimode SR (850 nm), single-mode LR (1310 nm) or single-mode ER (1550 nm)
- Data rate: 2 x 10 Gbit/s
- PCIe performance: 12.5 Gbit/s
- CPU utilization:
 - < 1% of the CPU is used for any data transfer
 - 0% of the CPU is used for any on-board processing
- Time formats: PCAP-ns/-µs, native, NDIS 10 ns/100 ns, UNIX 10 ns

Host Interface

- Bus type: 8-lane 2.5 Gbit/s PCI Express rev. 2.0 compatible
- Data transfer modes:
 - Bus master DMA
 - Memory write or memory read transactions
- Support for 32-bit/64-bit addressing and host DMA addressing

Statistics

- RMON1 counters plus Jumbo frame counters per port
- Frame and byte counters per filter and per host buffer
- Counter sets always delivered as a consistent time-stamped snapshot

Adapter Hardware

- Flash: Supports two boot images
- Memory options: Standard SO-DIMM 200-pin 1 GB, 2 GB or 4 GB DDR2 RAM modules
- Physical dimensions: ½-length full-height PCIe

Environment

- Power consumption: 36 Watts including XFP SR modules
- Operating temperature: 0 - 45 °C, 32 - 113 °F
- Operating humidity: 20 - 80%
- Hardware compliance: RoHS, UL, CE, FCC, CSA, VCCI, C-TICK
- MTBF: 200550 hours according to RIAC-HDBK-217Plus

Software

- Linux kernel 2.6: 32-bit/64-bit
- FreeBSD 6.x and 7.x: 32-bit/64-bit
- Windows Server 2003 and Windows XP: 32-bit/64-bit
- API supporting user level applications
- LibPCAP support
- SDK tools included in source code for debugging and prototyping and as examples of how the adapters are used

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 Control and Assurance, and Network Traffic Generation appliances. Napatech has a strong international focus supporting OEM customers worldwide with headquarters and development located in Denmark, and sales and customer support located in the USA.

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