

# NETRONOME NETWORK FLOW MANAGER



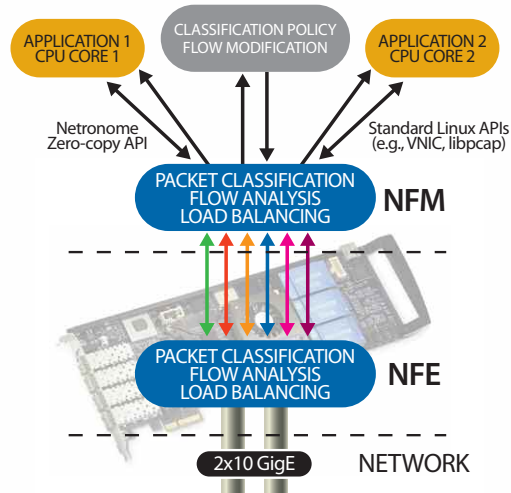
## Acceleration for Network and Security Applications

The Netronome Network Flow Manager (NFM), coupled with Netronome's Network Flow Engine (NFE) PCIe acceleration hardware, enables application acceleration, deep packet inspection (DPI) and flow analysis in a highly scalable manner for significantly increased application performance and greater control over network traffic. The NFM accelerates standard Linux® applications and provides an open application programming interface (API) for development of network and security appliances and applications. The NFM significantly reduces appliance CPU utilization and packet delay/jitter by offloading complex flow classification and packet processing to the NFE. The NFM software provides developers with an abstraction layer exposed via standard C APIs that control the packet processing occurring in the NFE microengine cores, allowing users to benefit from hardware-based acceleration while focusing development on their software applications.

The Netronome flow processing solution scales to 20 Gbps for packet and flow classification, packet capture and transmission for each NFE instance, providing unmatched visibility and control of traffic at L2-L7 for over eight million simultaneous flows.

## Stateful Flow Processing

The NFM has the ability to apply actions to flows, offering powerful, stateful flow analysis for applications with per flow timeout values. The NFM allows active (inline/filtering) or passive (offline/capture) enterprise and networking applica-



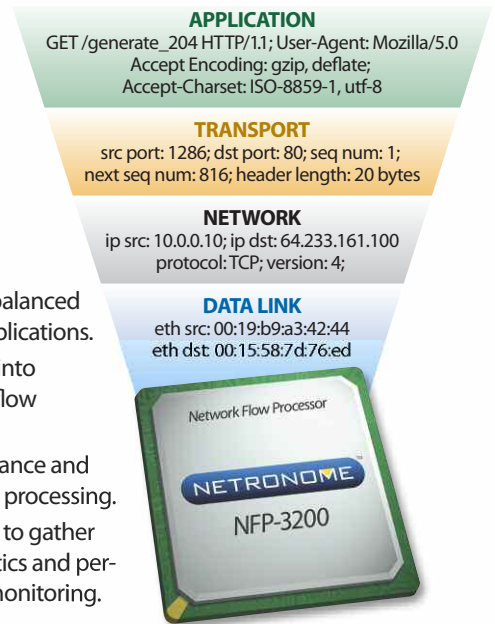
tions to perform one or more unique actions on flows once they have been identified, including:

- Cut-through: All classified flows are switched through the appliance in hardware by the NFE.
- Drop: An active or silent drop policy is applied to flows based on rules or application.
- Load balancing: Flows can be load-balanced across multiple x86 CPU cores or applications.
- Redirect: Strategically placing flows into specific host applications based on flow classification or DPI
- Tap: Flows are cut-through the appliance and copied to the host CPU(s) for further processing.
- Statistics reporting: The NFM is used to gather detailed packet and flow level statistics and perform general application and flow monitoring.

## Zero Copy Flow-based Load Balancing

Users can improve their application performance and exploit multicore CPU parallelism by balancing flows across x86 CPU cores using the NFM's flow-based dynamic load balancing. The NFM uses a zero-copy interface to deliver packet or flow data from the NFE directly to Linux user space applications, bypassing the Linux® kernel and networking stack. With support for IPv4, IPv6, MPLS and GRE, the NFM will load-balance flows to the host on a per rule, per flow basis to over 2,000 x86 endpoints, while offering configurable hash algorithm and hash key composition. This flow balancing significantly improves the CPU cache performance, assuring that all packets that belong to a flow will always arrive at the same CPU core or application destination. Packets do not have to be copied between cores, allowing the CPU caches to remain unpolluted, leading to few cache misses and greater application performance. The load balancing implementations measures and accounts for host CPU utilization. If the load on the destination CPU exceeds a configured threshold value, new flows that subsequently arrive will be assigned to a different load balancing destination.

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Netronome's flow processors and network acceleration products offer a highly programmable heterogeneous multicore co-processing environment that tightly couples the packet processing of the NFE microengine cores with the performance and ubiquity of general-purpose multicore x86 systems.

The NFM software allows appliance manufacturers to quickly improve the performance of existing products and reduce overall development costs of their network, security and DPI applications.

The NFM scales to 20 Gbps for packet and flow classification, packet capture and transmission for each NFE instance.



For more information about other Netronome products, please visit [www.netronome.com](http://www.netronome.com).

## Packet Metadata

To provide more context and background on each packet received by the application, NFM provides up to 30 metadata fields that are included as part of the packet structure. These metadata fields can be used to help the developer understand more about each flow such as its flow ID, state, and ingress port and relieve the CPU from complex tasks such as identifying L3, L4, and Payload offsets and packet timestamping. The following is an abbreviated list of available fields:

- Ingress External Port (NFPP)
- Ingress NFE Port
- Egress External Port (NFPP)
- Egress NFE Port
- Flow ID
- Flow Type (State)
- Snaplen Applied
- L3 Header Offset
- L4 Header Offset
- Payload Offset
- Timestamp
- User Defined

## Libpcap Support

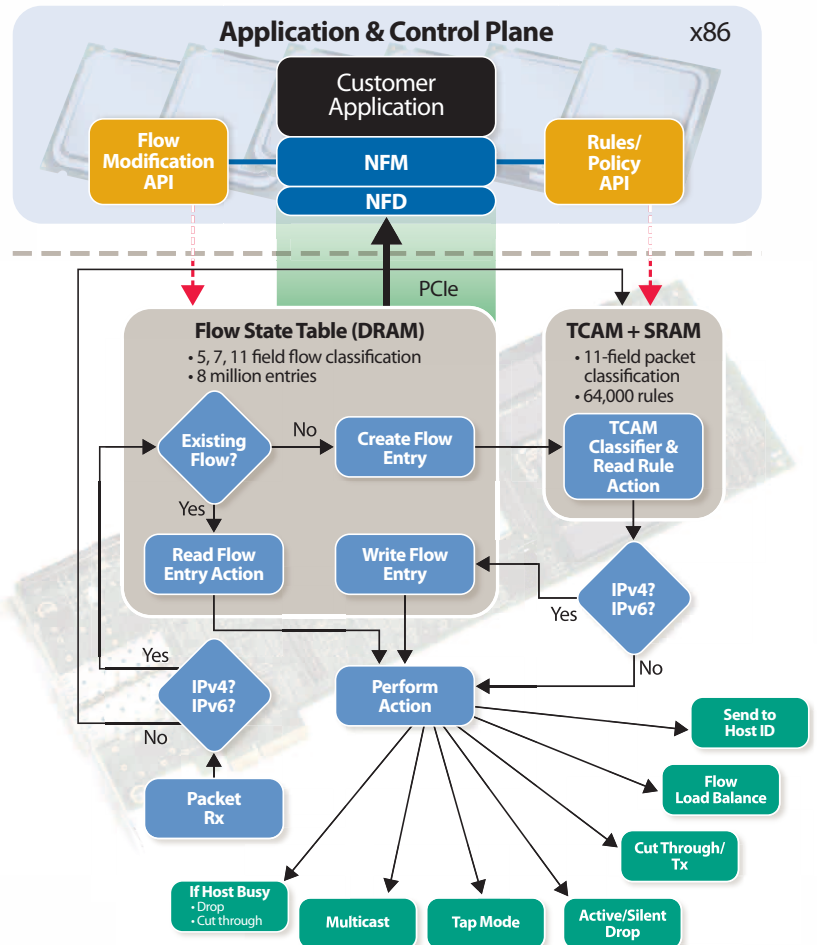
To capitalize on the widespread availability and development of packet capture applications, the libpcap library is compatible with Netronome's family of flow acceleration hardware. This provides developers with access to Netronome's hardware-based ME acceleration without changing their application's underlying packet acquisition methodology or software architecture.

## Additional Features and Benefits

### NFM 2.5 Features

- 64k TCAM-based L2-L4 packet classification rules
- L4-L7 stateful flow analysis for 8 million flows
- Full support for IPv4, IPv6, MPLS, GRE
- Passive, tap or inline packet capture modes
- Support for per-port interface sets
- Load balancing to application instances – IPv4, IPv6, MPLS, GRE, non-IP packets (ARP)
- Multi application flow delivery
- Parallel application voting
- Application-based packet modification
- Application hang detection
- Configurable errored packet delivery
- Software-configurable fail-to-wire
- NFE-to-host packet/flow throttling
- Packet timestamping
- Jumbo frame support

## Netronome Flow Processing



### NFM 2.5 Hardware Support

#### HOST PLATFORMS

- The NFM is compatible with a wide range of IA/x86 server motherboards and systems.

#### SUPPORTED HOST OPERATING SYSTEMS

- The NFM is compatible with all leading Linux environments, including Fedora and CentOS with 64-bit support for Linux kernel 2.6.x.

#### SUPPORTED ACCELERATION CARDS

- Netronome Flow Engine (NFE-i8000/NFE-3240)
- 12x1 GbE Load Balancing Interface Module
- 4x10 GbE Load Balancing Interface Module
- Netronome Pluggable Network I/O and Switch/Load Balancing Modules



The Flow Processing Company

Netronome has operations in:

USA (Pittsburgh [HQ], Santa Clara & Boston), UK (Cambridge), Malaysia (Penang), South Africa (Centurion) and China (Shenzhen, Hong Kong)

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