Use Case
High-performance DPI applications quickly and accurately classify both enterprise and consumer applications, sub-applications and protocols, enabling network operators to provide differentiated network services such as security, monitoring and QoS. Many DPI solutions can even distinguish among the voice, video, chat and file transfer capabilities of most social applications. Due to the incredible speed at which these applications and protocols change in today’s dynamic environment, DPI is often optimized to run on x86 multicore processors.

Netronome’s flow processors and software can dramatically accelerate x86-based DPI applications. Through a set of open APIs, the DPI engine and the flow processors work in tandem to provide unparalleled classification accuracy with industry-leading performance. In the flow processor, a stateful flow table is maintained that allows per-flow action processing at line rate. Initially, all packets of a flow are sent to the DPI engine for application classification. Through simple API calls, once the application flow has been identified, the action handling of the traffic is offloaded to the flow processors.

The powerful combination of Netronome’s Flow Processing and x86-based DPI engines provides an extraordinarily powerful technology pairing, providing industry-leading visibility into network flows at incredible throughputs.

### Features

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<th>Features</th>
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| Stateful flow management for 10s of millions of flows | • Eliminates need for flow table management in the application space  
• Policy enforcement on the NFP on a per-flow basis |
| Dataplane offload to NFP          | CPU cycle savings for 5x application performance improvement |
| 56B of packet metadata            | • Dynamically manipulate state or context of a flow  
• Information provided by the NFP reduces the number of required lookups |
| Multi-application flow delivery   | Permit many DPI applications to monitor and vote on action for a single flow simultaneously |
| Production-ready source with optional C userspace APIs | Enable application to use the datapath to the NFP to manipulate flow actions, flow state, rules and priority lists |
| 64K single-buffered or 32K double-buffered L2-L4 rules | Enforce filters and priority lists with high-speed, specialized hardware via NFP or TCAM |
| Dynamic and hash-based load balancing | By designing a run-to-completion model or parallel pipelines for the application, load balancing enables scalability for multiple cores/threads |

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The Netronome Solution

Deep Packet Inspection (DPI) is a compute-intensive function that can dramatically benefit from acceleration techniques. Netronome’s flow processors provide unparalleled performance for DPI applications by offloading compute-intensive data plane, flow, and security processing from the x86 CPUs. This solution tightly couples flow processors with the performance and scalability of general-purpose multicore x86 processors. This heterogeneous multicore architecture sets a new performance benchmark for network appliances with multiple layers of workload-specific packet, flow, security and application processing, each with increasing levels of granularity.

In this architecture, on a per-flow or per-application basis, a wide range of actions can be applied to the packets of a flow(s). At the NFP, traffic can be:
- Actively or passively dropped
- Cut-through from ingress to egress interfaces
- Redirected from the DPI app to alternate destination
- Load-balanced across a set of x86 cores
- Load-balanced across a set of egress interfaces
- L2-switched or L3-routed
- Encrypted/decrypted
- Inserted into a tunnel (IPsec, SSL, IP in IP, GRE)
- QoS-applied
- Rate-limited
- Translated via NAPT
- Added to or translated
  – VLAN, MPLS, IP, VxLAN, DSCP

Benchmarks

The NFP provides over 200 cores, 1000 threads and 250 billion instructions that can be applied to traffic every second, making the highly parallelized system ideal for processing millions of flows. As a result, the systems coupling NFPs to x86 processors can scale to 200 Gbps of Deep Packet Inspection, while greatly reducing CPU utilization compared to x86-only designs. DPI applications can now achieve these unprecedented performance levels without hitting flow processing bottlenecks in software-only implementations, while retaining the flexibility that is needed considering the rapid change in today’s applications and protocols.