

Naples DSC-100 Distributed Services Card

OVERVIEW

The Pensando **Naples™ Distributed Services Card** (DSC) delivers a broad suite of software-defined services at the compute edge. Naples installs easily in standard servers, combining high-performance networking, security and storage functions together with pervasive observability and ease of management.

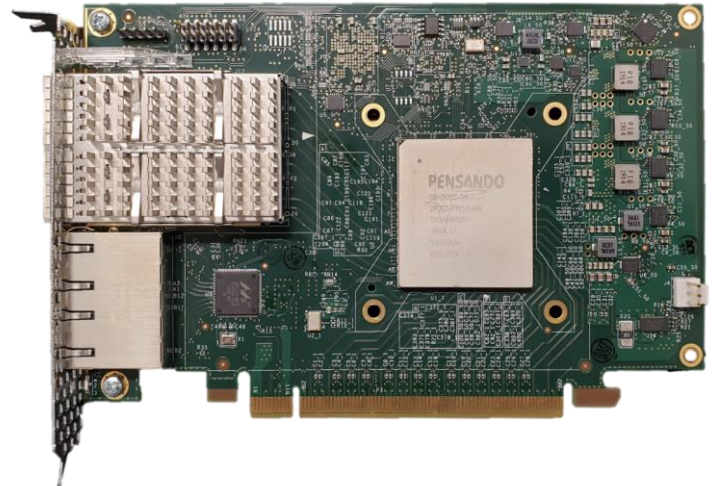
Just as cloud data centers have adopted a “scale out” approach for compute and storage systems, so too the networking and security elements should be implemented as a *Scale-out Services Architecture*. The ideal place to instantiate these services is the server edge (the border between the server and the network) where services such as overlay/underlay tunneling, security group enforcement and encryption termination can be delivered in a scalable manner. In fact, each server edge is tightly coupled to a single server and needs to be aware only of the policies related to that server and its users. It naturally scales, as more DSC services capabilities come with each new server that is added.

Services deployed at the server edge provide a clean separation between tenant's compute instances and the cloud infrastructure functions. This separation enables cloud operators to manage their infrastructure functions efficiently and provides a cost-effective means to save more compute resources for revenue generation, while simultaneously delivering better performance and scale.

The programmability and agility of the Naples platform allows customized functionality to be developed by cloud providers, speeding innovation and competitive differentiation.

INTEGRATED SERVICES

Pensando offers a suite of robust software services packages that implement cloud infrastructure functions for networking, storage, security and observability. The services packages may be used as a starting point for developers or be used as-is and managed via Naples gRPC/REST APIs. The APIs allow integration of Naples devices into the management and orchestration control plane of the cloud provider. The APIs also allow for device management (health monitoring, software updates), collecting metrics, and configuring policies for networking, storage and security.



Naples DSC-100 PCIe Card*

HIGHLIGHTS

FEATURES

- Integrated security, networking and storage functions in a single card
- Incorporates both data plane and control plane, eliminating host agents
- Customizable data plane - customers can develop their own software on the platform
- Pre-built Services packages for various functions, tested for scale.
- Supports cloud-scale networks with >100k firewall rules and >1M routes

BENEFITS

- Deliver Software-Defined Networking (SDN) services at unprecedented performance and scale
- Achieve deep visibility into network behavior with 'Always-On' telemetry
- Free CPU resources for monetizing by offloading networking and security functions at wire speed with extremely low latency and jitter
- Improved data center efficiency and lower OpEx
- Consistent Infrastructure for virtualized, bare metal and containerized workloads

* Heatsink removed

NETWORKING, SECURITY and STORAGE SERVICES

Available Naples software services packages include:

Advanced Observability – Flow-based packet telemetry, stateful conntrack, latency metrics, drop statistics, threshold alerting, ERSPAN (bi-directional), Netflow/IPFIX

Advanced Networking – Virtual Private Networks (network overlays), L3 ECMP, Load Balancing, NAT, PAT

Advanced Security – Stateful firewall, security groups, NACLs, VPN termination (IPsec), TLS/DTLS encryption, TLS Proxy

Enhanced Storage – NVMe virtualization, NVMe-oF with RDMA or TCP transport, AES-XTS data-at-rest encryption, compression, SHA-3 deduplication, CRC64/32 acceleration

AGILE PLATFORM FOR CLOUD PROVIDERS

The Naples DSC-100 is the ideal software-defined platform to bring high-performance and efficiency to the cloud infrastructure. Developers can create customized data plane services that are targeted to 100G throughput, microsecond-level latencies, and that scale to millions of flows. High-level programming languages (P4, C) enable rapid development and deployment of new features and services.

USE CASES

- Multi-Tenant SDN, Virtual Networking with flexible encapsulations (VXLAN, etc.), Security Groups
- Routing, Segment Routing, MPLS, BGP/eBGP
- Comprehensive Observability and troubleshooting into network, storage and security functions
- Flow capture/mirroring (bidirectional ERSPAN)
- Network load balancing, including TCP/TLS termination
- Storage virtualization & offload (NVMe-oF over TCP or RoCE)
- Data Compression/Decompression

ENABLING CLOUD INFRASTRUCTURE

- Virtual Private Cloud (VPC)
- Security Groups, firewall, DDoS protection
- Transit gateway & VPC peering
- NAT gateway
- Load balancer
- Metering, rate control and QoS marking
- SR-IOV for workload traffic/resource isolation
- IPsec/VPN gateway

PERFORMANCE & SCALE

Naples delivers 100G wire-speed services on each of its QSFP-28 ports, including chained services such as L4 stateful firewall + IPsec encryption + Load Balancing.

Performance Metric	DSC-100 Performance
Stateful Firewall throughput	100Gb/s full-duplex
Load Balancer throughput	100Gb/s full-duplex
Encryption throughput	100Gb/s (AES-GCM-256, @ 256B pkts)
Compression throughput	100Gb/s compress + 100Gb/s decompress
Packet rate [†]	40Mpps
Connections per Second	1M cps
Avg Latency [†]	3µs
Avg Jitter [†]	35ns

[†] Conditions: LPM, flow-lookup, Security Groups, NACL, VXLAN overlay

INDUSTRY-LEADING HARDWARE PLATFORM

Pensando's P4 Programmable Processor powers the **Naples** card, enabling wire-speed performance – even with chained services – as well as enhanced security through isolated enforcement of policy. The data plane and control planes are fully software-defined and supported with optimized hardware accelerators. Up to 8 GBytes of on-board DRAM provides the performance and flow-table capacity for true cloud-scale deployments.

HARDWARE SPECIFICATIONS

Form Factor	Full-height, Half-length PCIe
PCIe Interface	16-lane PCIe Gen4
Network Ports	2 ports QSFP28
Port Configurations	2x 40/100G, 4x 10/25/50G
Management Ports	2x RJ45 100M/1G Ethernet
Indicators	Port activity and link
Power	27-36W Typical
Cooling	Passive heatsink
Airflow	300 lfm airflow with DAC interface

Scale Metric*	Naples DSC-100 Scale
Route Tables (LPM)	1M IPv4 and 1M IPv6 – 2M total routes
	128k Local Mappings
Overlay Mappings	1M Remote Mappings

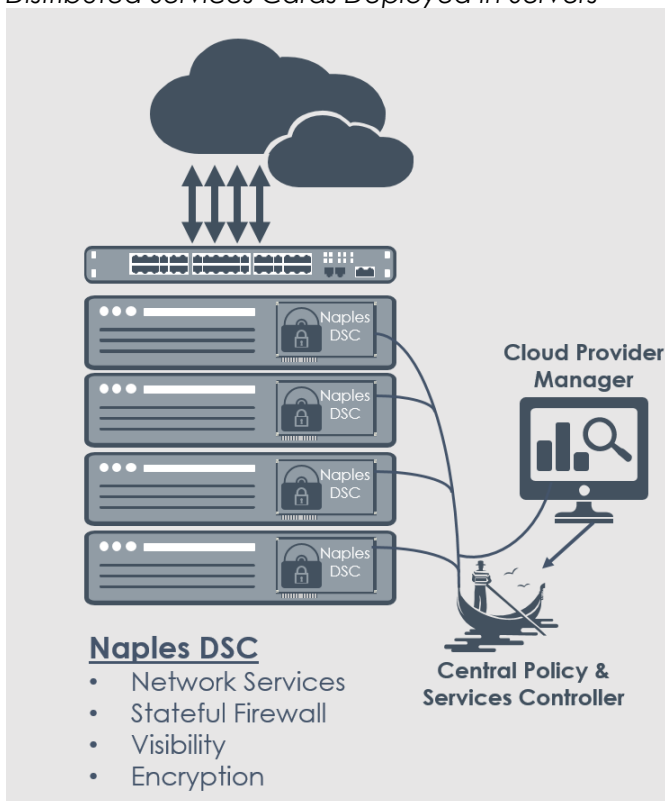
	1M IP address to TEP Mappings
Stateless ACL Entries	1M IPv4 AND 1M IPv6
Flow Table Entries	>1M depending on flow key size
IPsec Scale	100k tunnels @ 100Gb/s
NAT Mapping Tables	512k
Policers	4K

* Resource assignments are flexible and capacities above can be refactored

DEPLOYMENT CONFIGURATION

Naples cards are installed into data center servers to provide advanced services as well as high speed network I/O ports. Management is over the network in-band or out-of-band, either by Pensando's Venice controller or directly from cloud provider management systems via gRPC or other customer-provided management APIs.

Distributed Services Cards Deployed in Servers



NETWORK IN-LINE DEPLOYMENT

Naples cards may be deployed as network in-line devices – an ideal bare-metal solution as there is no need for drivers or agents on the host. Management of Naples is over the network, either in-band or out-of-band.

In-Line Distributed Services

