

# DSC2-200 Distributed Services Card

June 2023

## Overview

The AMD Pensando **Distributed Services Card (DSC)** delivers a broad suite of software-defined services at the compute edge. The DSC 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, networking and security services should be implemented leveraging a *Scale-out Architecture*.

There are two standard designs to deliver network and security services, storage (NVMe) services, overlay/underlay tunneling, security policy enforcement, and encryption termination in a scalable way:

## Server Edge

DSCs are installed in every server in the data center, running network/security/storage services related to the workloads on the hosting server. This approach enables virtually unlimited scalability as additional servers with Distributed Services Cards (DSCs) can be added.

DSCs can operate in a “host NIC” mode both delivering the networking and storage traffic to/from the host and implementing configured services as the traffic goes through. DSCs can also operate in a “bump-in-the-wire” mode where the DSC is connected between the switch and a regular NIC and is configured to forward the traffic from one port to another while implementing required services and policies.

## SDN Appliance

An alternative approach to address scalability, resource pooling, and help lower costs is to use multiple DSCs in a dedicated appliance, which provides services to a group of servers. In this case the traffic is redirected to go through the appliance on its way between the servers and the network. This can be a more cost-effective solution, especially for environments where bandwidth and latency requirements are less stringent or only portion of the workloads require security enforcement, encryption or other services. At the same time, this approach is horizontally scalable by adding more DSC-based



**AMD Pensando DSC2-200 PCIe Card**  
(shown with heatsink removed)

Form Factor	Full-height, half-length PCIe
PCIe Interface	16-lane PCIe Gen4.0
Network Ports	2 ports QSFP56
Port Configurations	- 2x40/100/200G - <u>Using Breakout cables</u> 4x10/25/50/100G
Management Ports (optional)	1x RJ45 100M/1G Ethernet
Indicators	Port Link/ACT(activity) and health LED
Memory (DDR4)	32GB
Power	65W typical
Cooling	Passive heatsink
Airflow	300 lfm airflow with DAC interface
Temperature (°C)	0 to 50 (Operational) -40 to 70 (Non-Operational)
Humidity	5 - 95% Relative

## DSC2-200 DISTRIBUTED SERVICES CARD

### HIGHLIGHTS

#### Features

Integrated security, networking, observability and storage services in a single card

Incorporates both software-defined data plane and control plane, eliminating host agents

Customizable control and data plane: customers can develop their own software, and integrate with existing management applications

Pre-built services packages for a variety of functions, tested for scale

Supports cloud-scale networks with 100k+ flow table entries 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 business apps by offloading infrastructure functions, running at wire speed with extremely low latency and jitter

Improved data center efficiency and lower CapEx and OpEx

Consistent services deployment for virtualized, bare metal and containerized workloads

appliances as the workload processing needs grow. A pair of DSCs installed either within the same appliance or within different appliances can provide high availability to redirected workloads.

Both designs provide a clean separation between cloud network infrastructure functions and each tenant's compute instances. This separation enables cloud operators to manage their infrastructure functions efficiently and independently of the tenants' workloads while freeing up the valuable compute resources from the infrastructure tasks and fully dedicating them to revenue generating business applications.

### Networking, Security, and Storage Services

AMD Pensando software services packages deliver a rich array of services based on the unique set of customer requirements as well as provide the flexibility for customers to develop their own services using the SSDK package. Services include:

**Advanced Observability:** Flow-based packet telemetry, stateful connection statistics, 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 with connection tracking, security groups, stateless and reflexive ACLs, 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 DSC2-200 is the ideal software-defined platform to bring high-performance and efficiency to the cloud infrastructure. Developers can create customized data plane services that target 400G throughput, microsecond-level latencies, and 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 and offload (NVMe-oF over TCP or RoCE)

Data compression/decompression

### Enabling Cloud Infrastructure

Virtual Private Cloud (VPC)

Security groups, firewall, DDoS protection

Transit gateway and VPC peering

NAT gateway

Metering, rate control and QoS marking

SR-IOV for workload traffic/resource isolation

IPsec/VPN gateway

**DSC2-200 DISTRIBUTED SERVICES CARD**

**Industry-Leading Hardware Platform**

The AMD Pensando Elba P4-programmable data processing unit (DPU) powers the DSC2-200, enabling wire-speed performance—even with multiple chained services—while enhancing security through isolated enforcement of policy. The data plane and control planes are fully software-defined and supported with optimized hardware accelerators. Up to 64 GBytes of DDR4/5 memory provides the performance and flow-table capacity necessary for cloud-scale deployments.

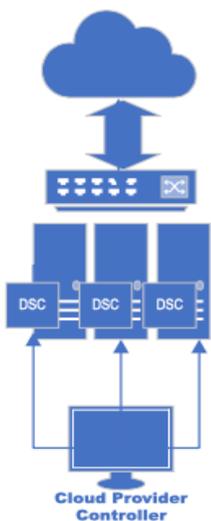
**Deployment Configuration**

DSCs are installed into data center servers to provide advanced services and high-speed network I/O ports. Management is over the network in-band or out-of-band, directly from cloud provider management systems via the AMD Pensando platform’s gRPC-based API or custom management APIs.

**DSC Host-Mode Deployment**

DSCs may be deployed in host mode, where DSCs are physically installed in the servers with required drivers and agents on the hosts that enables bi-directional data traffic flow between the host (BM, VM etc) and the DSC. Management of the DSC is over the network, either in-band or out-of-band or from host via PCIe connection. DSC also provides flexibility to integrate with user developed agents running on the DSC managing the interactions between orchestration tool and the DSC.

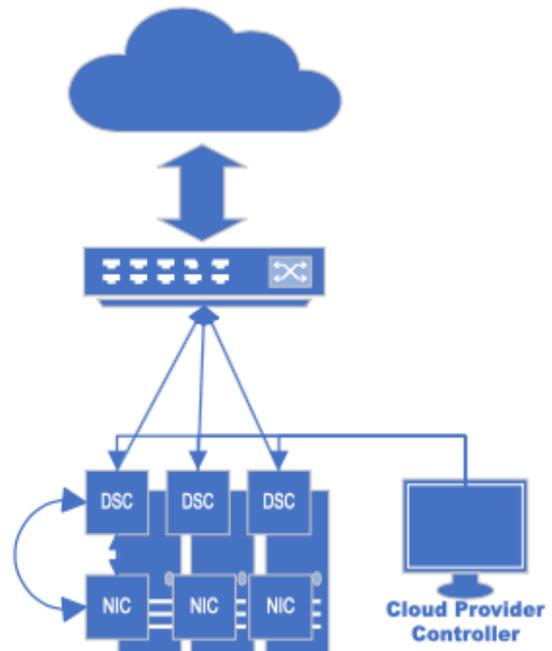
*Distributed Services Cards Deployed in Servers*



**Bump-In-the-Wire Deployment**

DSCs 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. While the DSCs are physically installed in the servers, the PCIe interface is only used to supply power. Management of the DSC is over the network, either in-band or out-of-band.

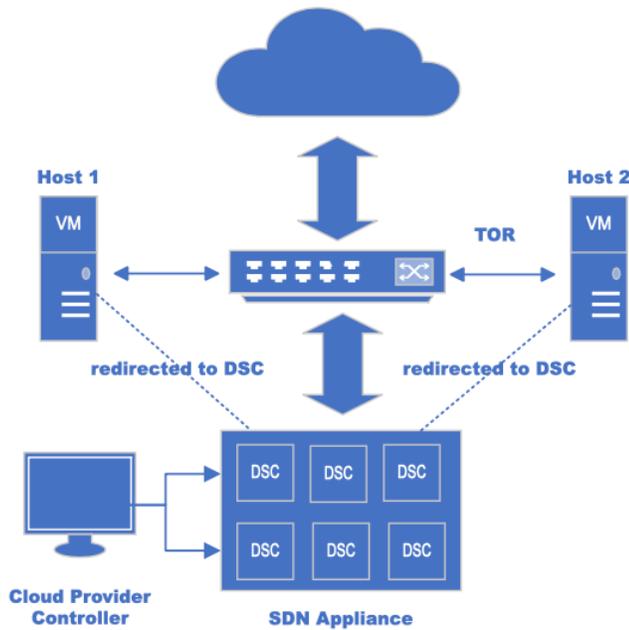
*In-Line Distributed Services*



**DSC2-200 DISTRIBUTED SERVICES CARD**

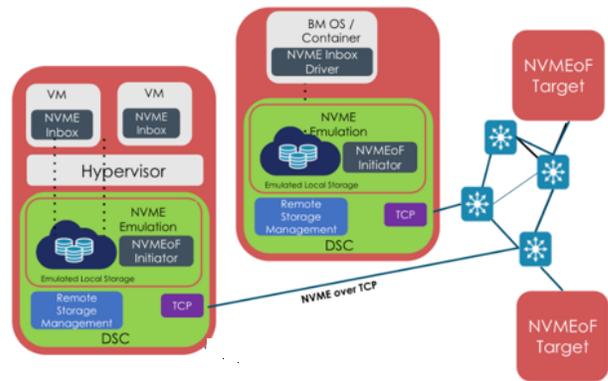
**DSCs in SDN Appliance Deployment**

Multiple DSCs may be deployed in an appliance server separate from the host servers. Workload-to-workload communication will be redirected to the appliance where DSCs will provide network & security services to multiple different workloads deployed on multiple different hosts. Appliance deployment can also support High availability mode, where a pair of DSCs installed either within the same appliance or within different appliances can provide high availability to redirected workloads.



**DSC NVMe Deployment**

DSCs may be deployed on compute servers, emulating NVMe virtual functions (VFs) along with all other network and security services that were listed above. These can then be consumed by the host operating system in bare-metal workloads, or by guest operating systems in pass-through mode in VM workloads. The NVMe VFs will be managed by standard inbox NVMe drivers. The NVMe driver issues NVMe commands over PCIe, which are terminated fully in the DSCs and originated as NVMe/TCP after encryption (AES-XTS: 128 or 256 bit keys with Header/Data Digest), NVMe/PCIe to NVmf PDU conversion and any applicable load balancing across NVmf target servers, achieving up to 2M IOPS.



**DSC2-200 DISTRIBUTED SERVICES CARD****Disclaimer**

The information presented in this document is for informational purposes only and may contain technical inaccuracies, omissions, and typographical errors. The information contained herein is subject to change and may be rendered inaccurate for many reasons, including but not limited to product and roadmap changes, component and motherboard version changes, new model and/or product releases, product differences between differing manufacturers, software changes, BIOS flashes, firmware upgrades, or the like. Any computer system has risks of security vulnerabilities that cannot be completely prevented or mitigated. AMD assumes no obligation to update or otherwise correct or revise this information. However, AMD reserves the right to revise this information and to make changes from time to time to the content hereof without obligation of AMD to notify any person of such revisions or changes.

THIS INFORMATION IS PROVIDED 'AS IS.' AMD MAKES NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THE CONTENTS HEREOF AND ASSUMES NO RESPONSIBILITY FOR ANY INACCURACIES, ERRORS, OR OMISSIONS THAT MAY APPEAR IN THIS INFORMATION. AMD SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR ANY PARTICULAR PURPOSE. IN NO EVENT WILL AMD BE LIABLE TO ANY PERSON FOR ANY RELIANCE, DIRECT, INDIRECT, SPECIAL, OR OTHER CONSEQUENTIAL DAMAGES ARISING FROM THE USE OF ANY INFORMATION CONTAINED HEREIN, EVEN IF AMD IS EXPRESSLY ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

AMD, the AMD Arrow logo, Pensando and combinations thereof are trademarks of Advanced Micro Devices, Inc. Linux® is a trademark of Linus Torvalds. PCI Express, PCIe® are trademarks of PCI-SIG Corporation. Arm® is the registered trademark of Arm Limited in the EU and other countries. Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies.

© 2023 Advanced Micro Devices, Inc. All Rights Reserved.

[amd.com/pensando](https://amd.com/pensando)

PPB23003