

AI Data Centers for Higher Education

Empowering high-performance computing for next-gen learning and research

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Building AI data centers

Meeting the challenge of AI data centers

AI is a game-changing technology for higher education and research institutions. From critical admissions decisions to heavily funded R&D projects, massive data ingestion, complex computations, and impossibly short time windows impose unique challenges to the competitive higher education landscape. Predictive and generative AI applications have been transformative, achieving pinpoint accurate outcomes in seconds versus months. To enable this transformation, data center operations tasked to deploy AI-ready data center infrastructures have struggled with the long lead times, complex deployments, and exorbitant costs of proprietary, single vendor AI data center solutions. But balancing the unique networking demands of High Performance Computing (HPC) and AI workloads against limited AI expertise and time to market pressures have left operations with few alternatives. Until now.

Deployments of Juniper Ethernet with RoCE and Apstra vs Infiniband result in **55% TCO savings**

Juniper delivers high performance AI-Native Networking solutions and operations tailored to higher education institutions and research centers. Juniper's AI data center solution is a quick way to deploy high performing AI training and inference networks that are the most flexible to design and easiest to manage with limited IT resources.

100% Interoperable with all leading GPUs, fabrics, and switches

We integrate industry-leading AIOps and world-class networking technologies to help customers easily build high-capacity, easy-to-operate network fabrics that deliver the fastest job completion times (JCTs), maximize GPU utilization, and simplify IT operations.



The capabilities you need

AI clusters

AI/ML training is a massive parallel processing problem requiring the world's most sophisticated data center networks to handle demanding AI cluster workloads. With high bandwidth, long-lived "elephant" flows and unpredictable traffic patterns, AI clusters challenge traditional data center designs. New rail-optimized data center architectures are required to optimize AI performance, but the learning curve can be steep, resulting in time and cost delays.

Comprised of frontend, backend, and storage networks, the performance and efficiency of AI training and inferencing clusters relies on low latency, lossless networking fabrics to optimize expensive graphics processing unit (GPU) compute. Using open, AI-optimized Ethernet fabrics across your entire AI data center deployment builds on existing IT expertise to optimize AI delivery without compromising choice and flexibility. Designed for performance and scale, Ethernet is now the premier networking technology of choice for AI data centers, delivering the lowest JCT and the fastest inferencing response times.

The answer: Juniper's education solutions

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Deploying AI data centers can be complex, but higher education IT teams don't have to do it alone. Juniper has invested in AI technology to drive innovation while simplifying the path to AI. Using a multivendor architecture of GPU compute, advanced storage platforms, and rail-optimized Juniper Ethernet fabrics of QFX Series switches, PTX Series routers, and Juniper Apstra data center automation, Juniper's Ops4AI Lab is open to enterprises to qualify custom AI cluster designs prior to deployment. Using both open source and Bring Your Own Models (BYOM), the AI Innovation Lab is there to help customers eliminate uncertainty.

Juniper's Ops4AI Lab is also the engine that drives our Juniper Validated Design (JVD) pipeline of pre-validated, multivendor AI data centers. Through JVDs, enterprises can mix and match supported compute and storage infrastructures with Juniper's advanced AI data center designs to eliminate guesswork and simplify what is often a complex design and deployment. Using Apstra data center automation, enterprises can design blueprints to be used for custom deployments or use Juniper's Terraform provider to download GitLab hosted AI blueprints for backend compute, backend storage, and frontend management.

Core capabilities

Apstra	Apstra, Juniper's data center automation solution, enables operators to automate the entire data center network life cycle across multivendor environments from design to ongoing operations. Apstra provides continuous validation, a single source of truth, powerful analytics, and rapid root cause identification and remediation
QFX Series switches	This industry-leading line of switches delivers superior throughput and scalability, a comprehensive routing stack, the open programmability of Junos® OS, and the broadest set of EVPN-VXLAN and IP fabric capabilities
PTX Series routers	PTX Series routers form the foundation of the world's largest core and WAN architectures. Powered by the latest generation of the Express family ASICs, the routers are cloud-optimized to enable smooth 800GbE migrations. They simultaneously deliver the scale, flexibility, and investment protection needed to meet today's market needs
Marvis Virtual Network Assistant	Marvis is the first and only AI-Native VNA for the data center, delivering the best insight throughout the entire data center life cycle across any vendor's hardware. In addition, Marvis provides end-to-end visibility and assurance across all enterprise domains, from campus and branch to data center
Junos OS Evolved	This unified, end-to-end network operating system provides reliability, agility, and open programmability for successful cloud-scale deployments

Our advantage

Your trusted data center partner

Juniper's AI data center network follows an industry-standard dedicated IP fabric design. Three distinct fabrics (backend, frontend, and storage) provide maximum efficiency while maintaining focus on AI model scale, expedited completion times, and rapid evolution with the advent of AI technologies. Configurations are given along with optimal hardware. In all, the best platforms are detailed in terms of features, performance, and the roles that are specified in this JVD. The AI JVD design enables operators to orchestrate a training cluster systematically without a need for in-depth prerequisite knowledge of the required products and technology.

Why Juniper

The NOW Way to Network

Juniper Networks believes that connectivity is not the same as experiencing a great connection. Juniper's AI-Native Networking Platform is built from the ground up to leverage AI to deliver exceptional, highly secure, and sustainable user experiences from the edge to the data center and cloud. Additional information can be found at Juniper Networks (www.juniper.net) or connect with Juniper on [X](#) (Twitter), [LinkedIn](#), and [Facebook](#).

More information

To learn more about Juniper's education solutions, visit our website

To learn more about Juniper education solutions, visit www.juniper.net/us/en/solutions/education.html

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