Highspeed Optical Switch (HOS)

Disruptive data switch technology

that saves energy and increases throughput speed

The PQT-HOS uses diffracted light instead of semiconductors to switch data.

This offers dramatic cost savings to large data centers.

Based on a patent developed and owned by the University of Arizona Optics Department, this technology is ***solely licensed to Post-Quantum Tek (PQT).***

POST-QUANTUM TEK

PQT's Highspeed Optical Switch (HOS)

... a small but powerful niche in the data center ecology

- **All-optical data path**
  - generates less heat, so it reduces energy consumption
- **Faster**
  - increases throughput dramatically
  - uses simultaneous connections
- **Integrated switch functions**
  - utilizes Application Programming Interface (API)
  - supports multiple cloud vendors

HOS Features

- Carries signals with data rates of 1Tb/s
- Provides transmission capability well beyond today's 100Gb/s switches
- Keeps the signal in the optical domain, allowing for channel multiplexing and aggregating
- Reduces the need for cooling redundancy
- Ideal for management of large 'elephant' data files
- Simplifies network management
- Significantly reduces reconfiguration times

HOS Value

- Reduces energy consumption by 1,000x per switch
- Saves data centers money in reduced cooling costs
- Reduces need for additional data centers because of its enhanced performance
- Prolongs life span of the switch from 3-5 years to 20+ years (*projected*)
- Handles next generation of Internet with 5G
- Scales to accommodate increased data input/output

Cisco Annual Internet Report (AIR)
Trends going into 2026:

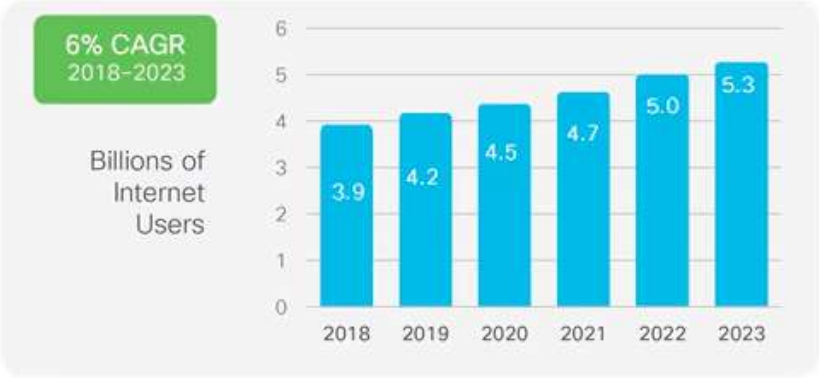
Trends

Section 1: Users/ Devices and connections

A. Growth in Internet users

Globally, the total number of Internet users is projected to grow from 3.9 billion in 2018 to 5.3 billion by 2023 at a CAGR of 6 percent. In terms of population, this represents 51 percent of the global population in 2018 and 66 percent of global population penetration by 2023 (Figure 1).

Figure 1. Global Internet user growth

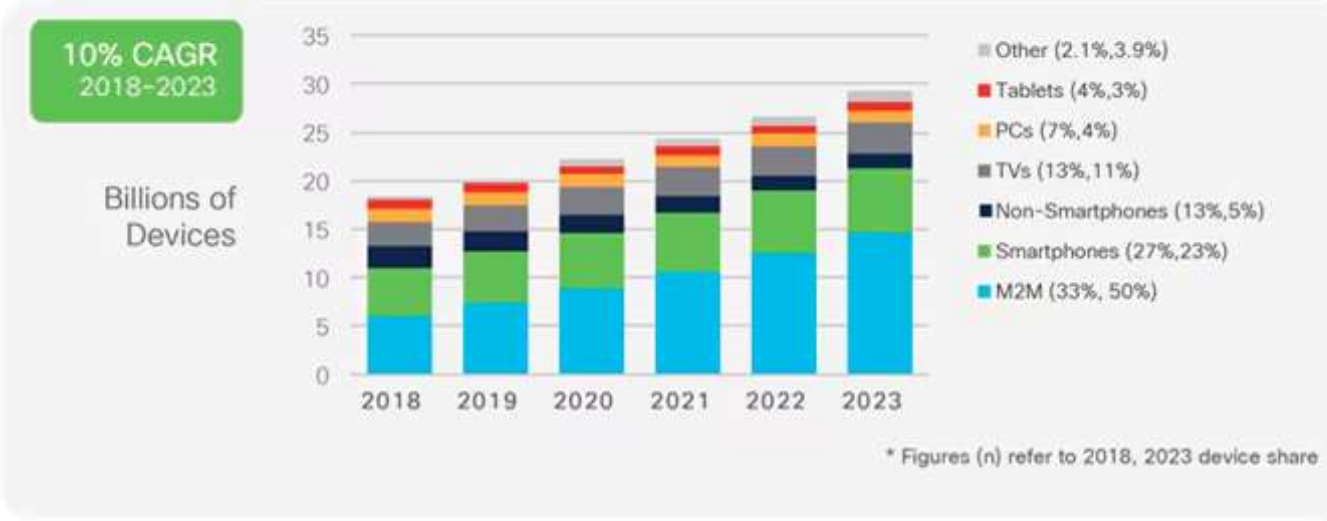


Source: Cisco Annual Internet Report, 2018-2023

2023 was the most recent report on indications

Cisco Annual Internet Report (AIR)
Trends going into 2026:

Figure 2. Global device and connection growth



Source: Cisco Annual Internet Report, 2018–2023

Globally, the average number of devices and connections per capita will grow from 2.4 in 2018 to 3.6 by 2023

2023 was the most recent report on indications

Global Data Center Traffic

An historical and projected view of global internet and data center traffic, AI trends, power consumption, and other key metrics from 1999 to 2025. These data underpin the time-series comparisons, showing general intra-DC traffic climbing from ~70 EB/mo in 2010 to ~1000+ EB/mo in 2020, and AI cluster traffic jumping from ~0 to dozens of EB/mo over the same interval, with an inflection in the early 2020s due to generative AI.

2021- 3.3 ZB/yr **2022- 4.4 ZB/yr** **2023- 6 ZB/yr**

2024- 7.8 ZB/yr **2025- 9.6 ZB/yr (*estimated*)**

Graphic from: fiberdan.com/global-data-center-traffic-infographic/

Cooler and Faster

Tests have demonstrated that the PQT Highspeed Optical Switch is:

- **Cooler**
  - Generates less heat than a conventional switch by 1000x
  - Reduces data center Power Usage Efficiency (PUE) value
- **Faster**
  - Throughput speed of 1Tb/s, 1000x faster than a conventional switch
  - Reduces need for additional switches to handle data throughput

Data Center Potential ROI

Data Centers Basics:

- Average Size: 10 acres
- Average Number Switches: 1,000
- Energy Costs: $300,000/Year

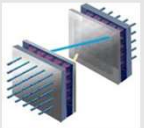
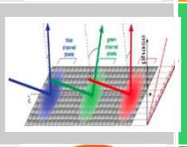
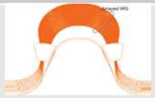
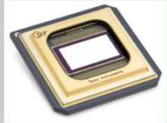
PQT Highspeed Optical Switch (HOS):

- 1,000X more energy-efficient
- 1,000X faster data speed
- Cost per switch: $100
- Price per switch: $300

Data Center Costs/Savings with PQT / HOS Installation:

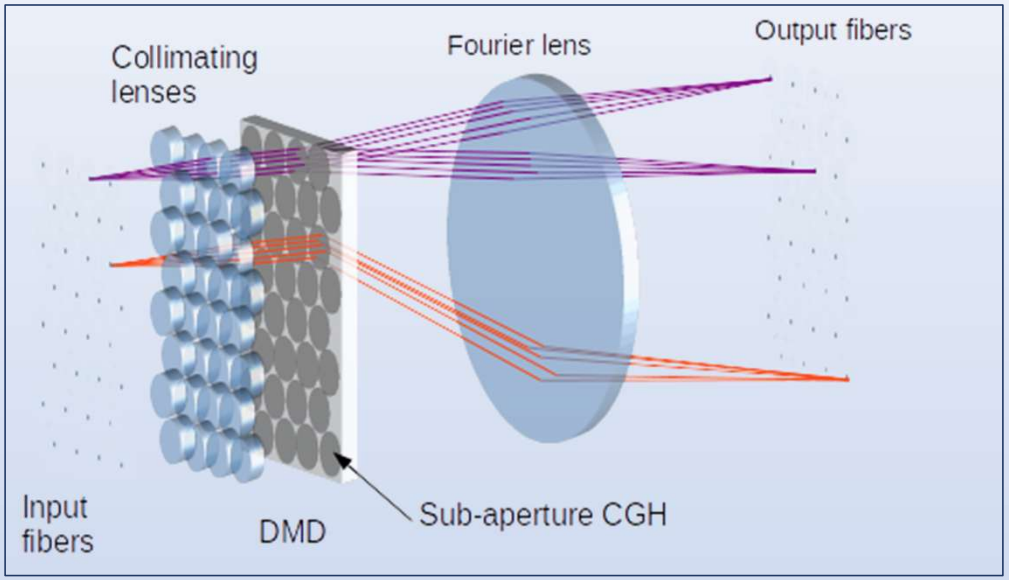
- Initial Installation Cost: $300,000
- Reduced Energy Cost: $300/Year
- ROI for Installation Cost: 1 Year

Current Competitive Landscape

Technology		Port count	Loss	Speed	Power
3D MEMS Calient/CrossFiber/ Gimmerglass		High (100s)	Low (3dB)	ms	High (45 W)
Micro-actuation Polatis/DirectLight		Moderate (100s)	Low (3dB)	ms	Very high (128W)
LCoS (WSS) JDSU/Nistica/CoAdna		High (100s)	Low (3dB)	ms (300Hz)	Low (1W)
AWG/SOA NTT/Academia		High (100s)	Moderate (6dB)	ns	Very high (50W)
Holographic with DLP as demonstrated		Very high (1000s)	Moderate (10dB)	ms (10kHz)	Low (1W)
PQT Highspeed with new MEMS		**Very high (10,000s)**	**Low (3dB)**	**ms (100kHz)**	**Low (1W)**

PQT Highspeed Optical Switch

How it works



B. Lynn et al. "Design and Preliminary Implementation of an N×N Diffractive All-optical Fiber Optic Switch", IEEE/OSA Journal of Lightwave Technology, 31 (24), pp 4016 – 4021, December 2013.

Pierre-Alexandre Blanche, PhD

Founding Research Scientist

- Associate Research Professor of Optical Sciences / College of Optical Sciences, The University of Arizona
- PhD in Physics (Optics) with the greatest distinction
- Expertise in diffraction optics, 3D display, non-linear and photonic materials
- Project Manager at TIPD LLC for the development of the Holographic 3D Display technology
- Author or co-author of more than 30 peer reviewed papers published in international journals: *Nature, Optics Communication, Optics Letters, JOSA B, Optical Engineering, others*
- Reviewer for international journals: *Optics Express, Macromolecules, Journal of the Optical Society of America, Applied Optics, Journal of Optical Materials, Optics Communication, Journal of Polymer Science: Polymer Physics, Nature Communications*

What experts are saying

Hassan Tanbakuchi, senior engineer, Agilent

“Post-Quantum Tek's digital switch has the potential to radically change the scope of data centers by switching from an electronic base to a new light layered MEMS switch that represents a major technology breakthrough, increasing data speed by 1,000X and significantly reducing energy consumption by 1/1,000.

“Upon the creation of a commercial prototype, Post-Quantum Tek’s HOS Switch could become the new technology standard for data centers.”

What experts are saying

Rusty Sailors, Chairman and CEO SSO (Secure Smart Office)

"Based on the information I've been provided concerning the Highspeed Optical Switch (HOS) Post-Quantum Tek (PQT) is developing, I recognize and like the fact that they are taking on a legitimate challenge in the industry for which a viable solution could make a significant impact. The concept for the technology is sound and I appreciate the specifics on comparisons to other technologies currently in use in the field and those undergoing continued development.

"Understanding this data throughput is a concern because of my specific experience on building very high scale, high performance, high security systems for some of the agencies I've consulted and worked with. In many cases, staging was necessary and even data format changes in order to achieve the throughput speeds we needed to achieve. This switch seems to have considered and met these challenges.

"Looks like an excellent technology with what could really become some true industry value."

POST-QUANTUM TEK

What experts are saying

"We find your intended digital switch application for data centers, as well as other potential applications for this technology, very exciting. In our estimation, such disruptive, rapid and low energy switching technology, once fully developed and deployable, could make for notable enhancements across other industries. A few instances that come to mind are applications in autonomous driving/LIDAR, artificial intelligence, and other high bandwidth requiring applications."

Best Regards,
Salah Uddin
Partner/Co-Founder
Nanoshift LLC

Highspeed Optical Switch