2026 ETHERNET ROADMAP

The Past, Present and Future of Ethernet

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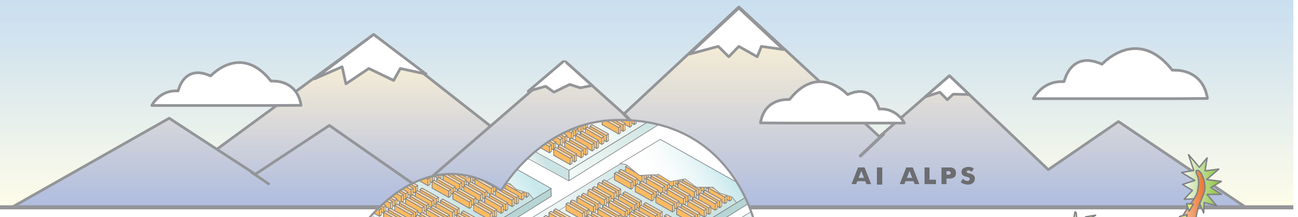
BASE CAMP ETHERNET —SCALING THE AI ALPS



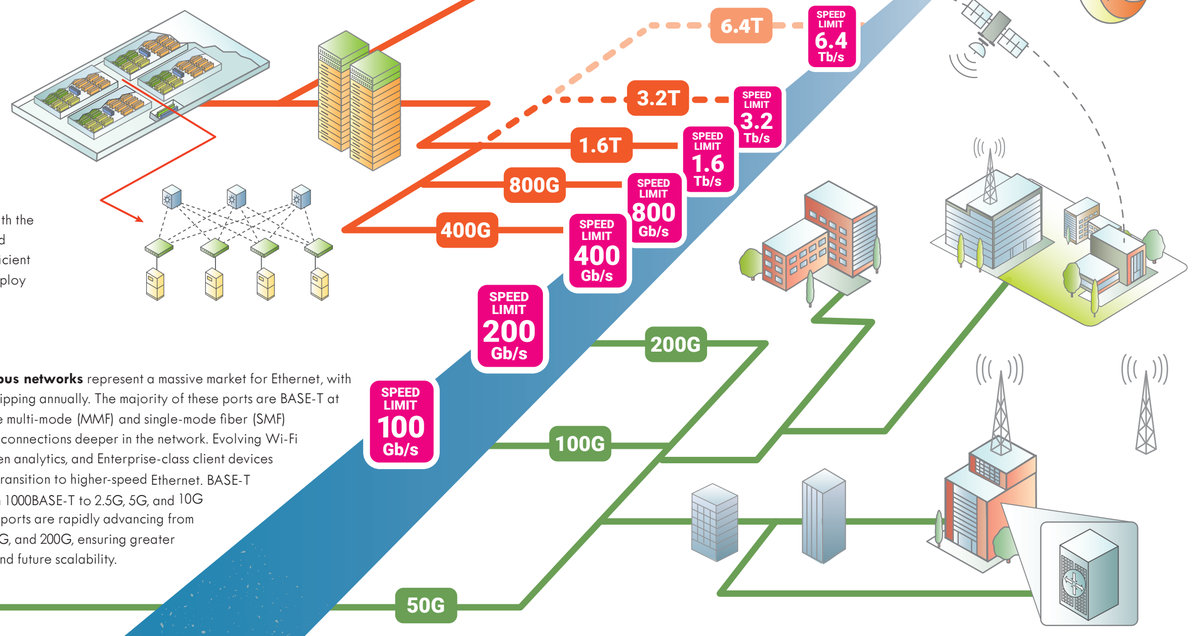
NETWORKS POWERING THE AI REVOLUTION

As AI reshapes the digital landscape, cloud and service provider networks are converging to deliver new levels of scale, speed, and intelligence. Ethernet continues to advance with innovations such as 1.6 Tb/s connectivity and Linear Pluggable Optics (LPO), enabling the performance, efficiency, and reach required to power AI-driven workloads across every domain.

CLOUD PROVIDERS

Cloud providers widely adopted 10G servers in 2010 to support hyperscale data centers. By the 2020s, surge in AI applications required faster connectivity, leading hyperscalers to transition from 25G/lane speeds to 50G, 100G, and beyond. These warehouse-scale data centers utilize a diverse mix of active and passive copper cables, multi-mode and single-mode fiber, and emerging technologies like LPO to support 100G, 200G, 400G, and 800G interconnects. The ongoing challenge is balancing bandwidth growth with power efficiency and cooling innovations to sustain rapid AI-driven scaling.

Over the past decade, the gap between Telco and Cloud provider networking needs has narrowed, particularly with the global expansion of 5G and AI services. Historically, Telcos drove technology advancements to match end-user and equipment demands, while cloud and hyperscale providers prioritized higher density, faster speeds, and energy-efficient interconnects. Today, these sectors are more aligned than ever, fostering greater collaboration to develop and deploy scalable, high-performance networking solutions that meet both enterprise and consumer market needs.



SERVICE PROVIDERS & ENTERPRISE

Service providers have long been at the forefront of high-speed Ethernet innovation, driving advancements in router connections, EPON, optical transport (OTN) client optics, and wired and wireless backhaul. The global rollout of 5G networks—and the growing adoption of AI-powered services—have intensified demand for scalable fronthaul and backhaul solutions, accelerating Ethernet's evolution toward higher speeds and longer distances.

With consumer video and AI-driven applications surging, bandwidth requirements show no signs of slowing. Service provider networks continue to push Ethernet speeds forward, with 1.6 Tb/s on the horizon to meet growing data demands. Synchronous Ethernet (SyncE) has become a cornerstone of 5G network synchronization, and its adoption is expected to expand significantly as Telcos deploy next-generation, AI-enhanced services.

Enterprise and campus networks represent a massive market for Ethernet, with over a billion ports shipping annually. The majority of these ports are BASE-T at the access layer, while multi-mode (MMF) and single-mode fiber (SMF) support higher-speed connections deeper in the network. Evolving Wi-Fi access points, AI-driven analytics, and Enterprise-class client devices are accelerating the transition to higher-speed Ethernet. BASE-T ports are shifting from 1000BASE-T to 2.5G, 5G, and 10G BASE-T, while optical ports are rapidly advancing from 10G/40G to 25G, 100G, and 200G, ensuring greater capacity, efficiency, and future scalability.

AUTOMOTIVE, WI-FI, ENTERPRISE & 5G

The **Automotive** industry is embracing Ethernet as the backbone of next-generation vehicle connectivity. Single-Pair Ethernet (SPE) enables cost-effective, scalable in-vehicle networking, supporting ADAS, autonomous vehicles, and infotainment while accelerating the convergence of legacy IVN technologies. A major shift to zonal architectures is reducing vehicle weight and complexity, while Time-Sensitive Networking (TSN) ensures deterministic, real-time communication for safety-critical applications. With software-defined vehicles (SDVs) on the rise and the rapid growth of the automotive Ethernet market, demand is surging for high-speed, low-latency networking. These advancements position Ethernet as the foundation for intelligent, connected transportation, delivering the performance, reliability, and scalability needed for the future of mobility.

As **Wi-Fi 7** (802.11be) rolls out, and with Wi-Fi 8 (802.11bn) on the way, Ethernet remains the backbone ensuring high-speed, low-latency connectivity for next-gen wireless networks. With multi-link operation (MLO), 320 MHz channels, and 4096-QAM, Wi-Fi 7 delivers faster speeds and improved efficiency, but reliable wired backhaul is essential to unlock its full potential. Ethernet's role in powering dense enterprise, industrial, and home networks continues to expand, supporting higher-speed and higher-power access points (APs), lower latency, and seamless integration with 5G and fiber networks. Increasing numbers of APs are using 2.5G/5G/10GBASE-T links for higher throughput, and the increased power available with 802.3bt PoE to support additional functions such as built-in GNSS/GPS, band steering and application hosting. The synergy between Wi-Fi and Ethernet is critical for enabling scalable, high-performance hybrid networks for the future

AUTOMATION, 5G, AUTOMOTIVE & ENTERPRISE

The convergence of Ethernet, Wi-Fi, 5G, and automation is transforming industrial and building networks. The flexibility of **Wi-Fi 7** and **5G** combined with Ethernet's delivery of power and data enables real-time, deterministic communication, crucial for Industrial IoT (IIoT) and smart automation. This synergy enhances network efficiency, scalability, and automation, paving the way for Industry 4.0 innovations.

Industrial and building automation applications are rapidly shifting from legacy fieldbus networks to Ethernet, accelerating the adoption of Interconnection, Information Transparency, Technical Assistance, and Decentralized Decisions—the core themes of Industry 4.0. Ethernet unlocks decades of IT networking advancements while delivering ruggedized physical layers including the growing family of the single pair BASE-T1 PHYs , designed for harsh operational environments. Additionally, Time-Sensitive Networking (TSN) is revolutionizing real-time automation by providing the services (e.g., time distribution, controlled latency) needed for modern industrial applications

INTEROPERABILITY AND CERTIFICATION

The Ethernet Alliance is committed to building industry and end user confidence in Ethernet standards through its multi-vendor interoperability demonstrations and plugfests. Our PoE Certification Program takes this mission to the next level!

Our industry-defined PoE Certification Test Plan is based on the IEEE 802.3 (Ethernet) PoE standards, and products passing this test will be granted the Ethernet Alliance PoE Certification Logo. The trademarked logo provides instant recognition for products based on these standards, and increases multi-vendor interoperability between products bearing it. The logos indicate the power class and product type providing clear guidance on which devices will work with each other.

The first generation of the program (Gen 1) certifies Type 1 and Type 2 products that use 2-Pair wiring (PoE 1). The second generation of the program (Gen 2) certifies Type 3 and Type 4 products using 2-Pair and 4-Pair wiring (PoE 2). See table below for details:

PoE Types and Classes	PoE 1 2-Pair PoE – Type 2 / PoE 1 2-Pair PoE – Type 1					PoE 2 4-Pair PoE			
Class	0	1	2	3	4	5	6	7	8
PSE Power (W)	15.4	4	7	15.4	30	45	60	75	90
PD Power (W)	13	3.84	6.49	13	25.5	40	51	62	71.3
	PoE 2 4-Pair PoE – Type 3					PoE 2 4-Pair PoE Type 4			

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