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The Invisible Backbone of AI:
The Critical Role of Regional Fiber Networks in Enabling Pennsylvania's Hyperscale Data Centers

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The Invisible Backbone of AI: The Critical Role of Regional Fiber Networks in Enabling Pennsylvania's Hyperscale Data Centers

By Mike Sicoli

The data center industry is experiencing an unprecedented land rush as hyperscalers race to secure power, land, and connectivity for AI training infrastructure. While billion-dollar campuses and gigawatt power deals dominate headlines, a more nuanced conversation is emerging about what it actually takes to bring these facilities online and how regional fiber providers are positioned to accelerate deployment timelines that national carriers cannot match.

Pennsylvania has emerged as a serious contender in this race, driven primarily by access to nuclear power and abundant natural gas with the potential for multi-gigawatt power generation. But between the announcement of a proposed site and the first server going live lies a complex web of infrastructure challenges that can make or break deployment schedules. Among these challenges, fiber connectivity represents both a critical requirement and a frequently misunderstood variable in site selection and development.

The Power-First Reality of Hyperscale Site Selection

Let's be clear about priorities: hyperscalers are in search of power above all else. AI training facilities require hundreds of megawatts — and increasingly gigawatts — of reliable power capacity. There are very few locations in North America where this capacity exists today or can be developed within reasonable timeframes.

> **"AI data centers need 50-150 kilowatts per rack compared to traditional 10-15 kilowatts."***

Pennsylvania has emerged as a potential source of new power generation, particularly in the western part of the state, which sits atop the Marcellus Shale, enabling large-scale natural gas generation to be built on-site alongside data center infrastructure. The region also has legacy manufacturing sites with existing power investments and developable land, plus retired coal plants that can be repurposed for natural gas or renewable generation.

Beyond power availability, hyperscalers evaluate buildable land sufficient for both data halls and generator loads, water resources for cooling and power generation, and favorable permitting and regulatory environments. Fiber connectivity ranks in the top four or five decision criteria, but it's generally not enough to override a site with superior power characteristics. That said, fiber infrastructure becomes mission-critical the moment a site is selected.

* Source: https://www.hanwhadatacenters.com/blog/what-are-the-power-requirements-for-ai-data-centers/

Understanding Hyperscale Network Requirements

Hyperscalers have exacting network requirements that differ significantly from traditional enterprise or multi-tenant data center connectivity. They typically require at least four diverse, very high-capacity underground fiber paths connecting each facility to major internet hubs like Ashburn, Columbus, Chicago, and Secaucus. These paths must be truly diverse: routes that never cross and maintain physical separation throughout their entire length.

Most of Pennsylvania's network infrastructure was not built to these specifications. Like much of the country outside major metro cores, the vast majority of existing fiber plant is aerial construction. This reflects both the region's challenging terrain, including mountains, rivers, and railroads, as well as its challenging permitting environment to obtain underground the rights of way. In addition, existing networks have evolved over the years to serve a variety of different customers, including enterprises, schools, wireless carriers, and multi-tenant datacenters, all of whom have different requirements than hyperscalers.

"A robust fiber investment for a hyperscale site might total tens of millions of dollars, compared to tens of billions for the data center facility and power generation."*

While this might seem like a significant barrier to hyperscale datacenter development in Pennsylvania, it is not, as the cost to build fiber infrastructure represents a fraction of overall project costs. A robust fiber investment for a particular hyperscale site might total tens of millions of dollars, compared to tens of billions for the data center facility and power generation infrastructure. It's a rounding error in the total capital outlay, and it can be accomplished well within the typical 24+ month construction timeline for power generation and data center facilities. The fiber piece doesn't have to be perfect at groundbreaking. It has to be adequate to meet initial requirements while the permanent infrastructure is being built in parallel with the data center itself.

* Source: https://insidetowers.com/ustelecom-permitting-delays-high-fees-stop-broadband-deployments/

The Regional Advantage: Speed, Expertise, and Flexibility

This is where regional fiber providers offer unique value that national carriers cannot replicate. For example, DQE Communications has been operating in Pennsylvania for more than 20 years, originally founded by a power utility to serve mission-critical infrastructure. Our 5,000-route-mile network was designed from day one for sophisticated enterprise use cases including power generation facilities, major healthcare systems, universities, and carriers. We're connected to every data center in the region already, along with significant wireless tower infrastructure.

Most importantly, we can reach any proposed hyperscale site in our footprint relatively quickly with aerial plant and have the ability to provide dark fiber and wavelength services to meet day-one requirements. While hyperscalers prefer underground infrastructure, they also understand deployment realities. Getting a site operational quickly with diverse aerial routes while purpose-built underground infrastructure is constructed makes both technical and financial sense.

Our local knowledge is also invaluable when it comes to designing and building the new underground fiber routes. Nobody navigates Pennsylvania's permitting landscape, PennDOT rights-of-way, utility pole access negotiations, railroad crossings, and municipal relationships better than providers who work in this environment every single day. National carriers sending teams from out of region face steep learning curves on processes, relationships, and terrain-specific engineering challenges that regional providers have been solving for decades.

"8 weeks to 6 months: fiber application processing timelines."

The business model matters too. Regional providers are willing to co-develop custom solutions aligned with specific hyperscale requirements. We're not trying to force every customer into standardized products designed for thousands of locations nationwide. If a hyperscaler needs a specific route, specific conduit configuration, or specific underground build timeline, we can design and execute that project as a true partner rather than a vendor.

Columbus as Proof of Concept

The evolution of Columbus, Ohio offers instructive precedent for what's possible in Pennsylvania. Ten years ago, Columbus was not an internet hub. It wasn't a hyperscale data center destination. But power availability, favorable zoning and permitting, and pro-development local policy created conditions for multiple hyperscale facilities.

As those facilities came online, Columbus organically emerged as a legitimate internet exchange point, not at Ashburn's scale, but a real peering destination. Companies now routinely mention Columbus alongside Ashburn and Secaucus when discussing connectivity requirements. The community of hyperscale tenants reached critical mass and realized they could hand off significant traffic volumes to each other locally rather than backhauling everything across the East Coast.

> **"Columbus proved the model: hyperscalers follow power; fiber follows hyperscalers."***

There's no reason Pittsburgh, for example, can't follow the same trajectory. Multiple hyperscale sites from different operators would quickly justify the underground fiber infrastructure investment to create true diversity and redundancy. The region would emerge as another strategic internet exchange point, further strengthening the value proposition for subsequent deployments.

The Regulatory Environment Is Evolving

One encouraging development: regulators at every level in Pennsylvania have demonstrated genuine bipartisan commitment to attracting hyperscale data center investment. The state recognizes its power advantage, manufacturing heritage that provides both skilled construction workforce and developable land, and innovation ecosystem anchored by University of Pittsburgh and Carnegie Mellon.

We're seeing this commitment translate into streamlined permitting and zoning processes for power generation and data center construction. The focus has understandably been on those elements first, but fiber permitting and rights-of-way access remain challenging and will need the same level of attention from regulators. Getting access to utility poles or conduit is harder and more expensive than ever, with power companies treating access applications as a nuisance and/or outsized cost recovery mechanism. PennDOT rights-of-way access is notoriously difficult to secure. Private landowner negotiations can delay projects by months when a single parcel owner along a 20-mile route refuses access or demands unrealistic compensation.

These aren't insurmountable barriers, but they do require attention. As Pennsylvania lands additional hyperscale commitments, regulatory focus will need to shift quickly toward expediting fiber infrastructure builds. The industry needs framework reforms that provide more standardized, predictable processes for securing rights-of-way across the 2,500+ municipalities in Pennsylvania.

The political will appears to exist. The AI Summit in Pittsburgh last year brought together President Trump, Governor Shapiro, and both Pennsylvania senators in a genuinely non-partisan event promoting the region's AI innovation potential. That kind of alignment creates opportunity for meaningful regulatory reform.

Beyond Training: The Edge Infrastructure Opportunity

While most industry attention focuses on massive training campuses requiring gigawatt-scale power, it's worth remembering that AI deployment happens in layers. Training infrastructure gets built in remote locations optimized for power availability. But inference, where AI applications actually deliver value to end users, happens at the edge.

As AI use cases mature and inference workloads expand, demand for high-performance, low-latency connectivity to multi-tenant colocation facilities, office buildings, hospitals, manufacturing plants, and universities will explode. This is where existing regional networks are already perfectly positioned.

The aerial fiber infrastructure that we have today is exactly what edge inference deployment requires: diverse routing, rapid deployment capability, and connections to the distributed facilities where compute workloads are consumed. Regional providers don't face a multi-year, multi-million-dollar construction program to serve edge AI demand. We're ready today.

This creates an interesting dynamic. The same regional network that can accelerate day-one connectivity for hyperscale training sites is also the optimal infrastructure for the inference layer that will ultimately drive broader AI adoption. As the industry matures beyond training to deployment at scale, the value of established regional networks compounds.

> **"$90B+ signals that Pennsylvania is becoming a serious AI infrastructure market."**

The Path Forward

Pennsylvania has legitimate advantages for hyperscale data center development: abundant power resources, developable land, skilled workforce, innovation ecosystem, and supportive regulatory environment. The fiber infrastructure gap is real but solvable, especially when regional providers with deep local expertise are willing to co-develop purpose-built solutions.

For hyperscalers evaluating sites, the key insight is that fiber buildout represents a small fraction of total project cost and can be executed well within overall development timelines, provided you engage the right partners early. National carriers may have bigger brands, but regional providers offer speed, flexibility, and local knowledge that can materially accelerate time-to-market.

For policymakers, the opportunity is clear: continue streamlining permitting and rights-of-way access processes. The infrastructure investment will follow project commitments, but reducing friction in build processes will help ensure Pennsylvania maximizes its competitive advantages.

"AI infrastructure will expand beyond the usual hubs. The winners will be the markets that can execute. Western Pennsylvania is positioned to do exactly that."

As more hyperscale projects are announced in Pennsylvania, the region will demonstrate that established markets don't have a monopoly on AI infrastructure. Places like Pittsburgh can emerge as new hubs when the right combination of resources, expertise, and collaborative partnerships come together.

The invisible backbone of AI infrastructure isn't just fiber cables in the ground. It's the local knowledge, nimble execution, and genuine partnership that regional providers bring to hyperscale development. Pennsylvania has the power and the land. We also have regional network providers ready and willing to build whatever network infrastructure the AI economy demands.

Mike Sicoli is CEO of DQE Communications, a Pittsburgh-based fiber-optic Internet and connectivity provider serving enterprise and wholesale customers in Pennsylvania, West Virginia, and Ohio.