

Building the Future: A Guide to Navigating Complex Connectivity Challenges in Data Center Construction

Overcoming IT strain and network complexities on the jobsite.

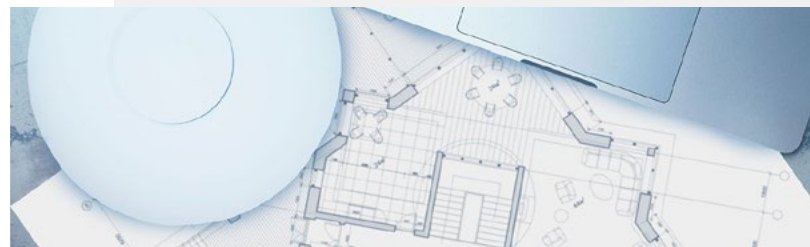


Cloud computing and artificial intelligence is driving an unprecedented surge in data center construction, with industry giants like Google and Meta investing billions to expand capacity.

However, **ensuring reliable connectivity across these massive jobsites is a huge challenge**. Without a strategic approach to jobsite connectivity, teams risk costly delays, security vulnerabilities, and inefficiencies that can derail projects.

This guide explores how construction teams can overcome these challenges to **keep data center builds on schedule** and operations running smoothly.

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BILLION-DOLLAR INVESTMENTS FUELING THE FUTURE OF TECH

As businesses and consumers generate and rely on massive amounts of digital information, the need for advanced infrastructure to support cloud computing, AI, and enterprise IT has never been greater. Technology giants like Google, Meta, and Oracle are investing billions to expand their data center footprints, pushing the U.S. data center construction market to an estimated \$187.1 billion by 2034, nearly doubling its 2024 valuation as reported by Precedence Research.¹

Microsoft expects to spend \$80 billion on data center construction during its current fiscal year.² Bloomberg reported Amazon Web Services (AWS) plans to invest \$150 billion over the next 15 years.³ Known as hyperscale centers, these facilities account for 37% of all data centers, a figure Synergy Research Group expects to double in the next four years.⁴

Overview

The rapid growth of data consumption is fueling an unprecedented surge in data center construction. While these high-tech facilities are critical to supporting artificial intelligence (AI)-driven applications, cloud computing, and the digital economy, constructing them presents unique challenges, especially when it comes to reliable internet connectivity. Without a stable network, project teams face costly delays, security vulnerabilities, and operational inefficiencies that can derail timelines and budgets.

Connectivity Complexities in Data Center Construction

Bringing and managing connectivity at data center construction sites is a complex challenge that goes beyond simply setting up internet access. These projects are often in remote, non-serviced, or newly developing areas where pre-existing network infrastructure or fiber connection may not be available, meaning everything—from sourcing a reliable internet provider to deploying temporary solutions—must be planned from the ground up. Jobsites are massive, requiring coverage that extends across vast areas while remaining dependable as the project evolves and walls go up.

Cost of Poor Asset Management

One of the biggest hurdles is managing the connectivity equipment itself. Companies often assume they can handle their own hardware procurement and deployment, until critical equipment goes missing. It's not uncommon for teams to misplace devices, reorder replacements, and then rediscover the originals months later, leading to unnecessary expenses and wasted resources. Without a structured approach to asset management, network equipment can easily become a costly liability.

Growing Strain on IT

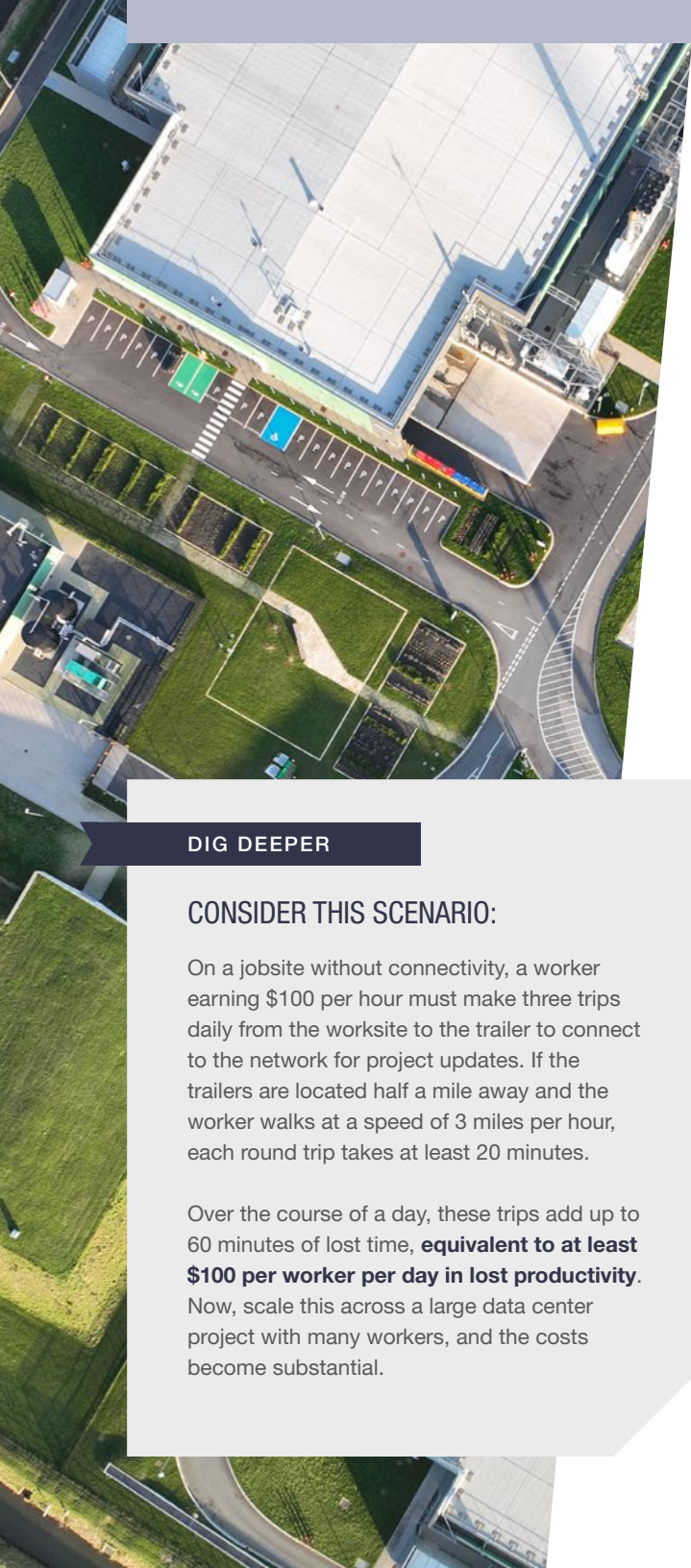
As companies take on larger projects and expand to multiple jobsites, the strain on internal IT teams grows. IT staff who are already responsible for corporate networks now find themselves managing unpredictable field conditions, troubleshooting connectivity failures, and responding to last-minute changes. This additional burden either stretches internal resources too thin or forces companies to invest in hiring more IT personnel.



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Addressing these challenges requires more than just technology; it requires a well-planned strategy that ensures seamless communication, uninterrupted workflows, and proactive network management.

This guide provides insights for general contractors (GCs), project managers, and IT teams to navigate the complexities of data center jobsite connectivity, enabling projects to stay on schedule without unnecessary delays or inefficiencies.



Why Are These Considerations Important?

A well-planned connectivity strategy is a critical component of efficient data center construction. Reliable, high-speed internet access ensures that teams can communicate instantly, access digital resources, and maintain safety protocols across the jobsite.

Live Communication Enhances Efficiency

Traditional communication delays, such as waiting for scheduled breaks to receive important updates or physically relaying messages across vast and often noisy jobsites, can create bottlenecks that significantly slow down overall project progress. These delays often lead to missed opportunities for timely decision-making, coordination breakdowns, and increased downtime, all of which ultimately impact project timelines and budgets.

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CONSIDER THIS SCENARIO:

On a jobsite without connectivity, a worker earning \$100 per hour must make three trips daily from the worksite to the trailer to connect to the network for project updates. If the trailers are located half a mile away and the worker walks at a speed of 3 miles per hour, each round trip takes at least 20 minutes.

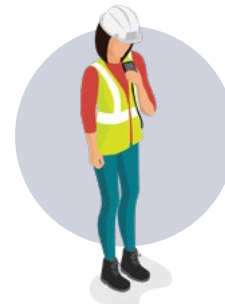
Over the course of a day, these trips add up to 60 minutes of lost time, **equivalent to at least \$100 per worker per day in lost productivity**. Now, scale this across a large data center project with many workers, and the costs become substantial.



Real-time connectivity allows teams to:



Instantly receive updates
on schedule changes,
material deliveries, and
worksite modifications.



Coordinate across trades
by facilitating collaboration
between GCs, subcontractors,
and project managers.



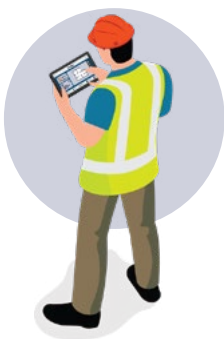
Reduce downtime by
ensuring that workers always
have access to digital tools
and workflow applications.

Real-Time Data Access Improves Decision-Making

Workflows dependent on cloud-based applications and real-time data sharing need to stay connected no matter where they are on the jobsite. This allows for the instant exchange of critical information, ensuring decision-makers have access to the most up-to-date data to help minimize errors, reduce delays, and improve overall project efficiency.

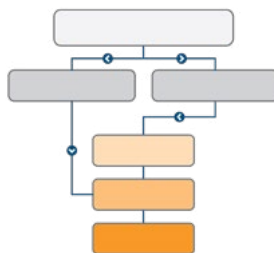


A robust network allows teams to:



Access digital blueprints and Building Information Modeling (BIM) without delays, keeping workers connected to the latest versions.

Utilize AI-driven project management tools to streamline scheduling, track progress, and optimize resource allocation.



Monitor site conditions remotely using IoT sensors, security cameras, and smart construction equipment.



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Owners often require surveillance cameras to be operational—and online—as soon as trailers are placed, with designated areas that must be monitored. Many enforce strict no-tolerance policies for issues like graffiti, making early camera deployment essential.

AI-powered cameras enhance security by enabling searches based on specific attributes, such as clothing color, allowing site managers to quickly locate footage, review incidents, or provide relevant evidence to law enforcement when needed.



Real-Time Monitoring Strengthens Emergency Response

On large-scale jobsites, reliable connectivity can mean the difference between a quick response and a critical delay. Once the data center's thick concrete walls go up, an area where cell-service may have been available is now a dead zone. In an emergency, workers could have to leave an injured person behind and go outside the structure or travel to the trailers to call for help. This delays emergency care—and risks lives.

With stable connectivity, workers can immediately alert safety personnel, provide real-time updates on the situation, and track hazardous conditions, ensuring emergency teams can act swiftly and effectively.



Reliable networks enable:

-  **Instant emergency alerts** to notify safety personnel and first responders.
-  **Real-time hazard tracking** through connected wearables and jobsite sensors.
-  **Live video monitoring** for improved site security and incident documentation.

CONSIDERATION

Connectivity Needs by Location

Bringing dependable connectivity to a data center construction site requires careful planning for three key areas: the trailer city, the active jobsite, and the data halls. Each location presents unique challenges that require specific solutions to support streamlined communication, productivity, and safety.

Trailer City

For large, hyperscale projects, GCs may look to bring fiber to the trailer yard before the project even starts. Building the required infrastructure for the fiber is time-consuming; however, temporary solutions, such as Wireless Internet Service Providers (WISPs), can be used in the interim.

These solutions are also frequently used by subcontractors who are unable to connect to fiber. Many GCs allow subcontractors to utilize a split-off fiber strand, so they can run a separate internet connection to subcontractors. Owners requiring their own networks can also utilize a split-strand, while ensuring the required internet speeds are maintained.



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Connectivity Needs by Location



Outdoor Field of Work

As construction teams move beyond the trailer yard and into the active jobsite, maintaining a steady internet connection becomes increasingly difficult. Connectivity is often interrupted due to distance from carrier towers, signal interference from new structures, and high user density due to the thousands of workers overwhelming the network.

In many cases, workers resort to using personal cell phone networks, which are neither secure nor consistent for jobsite operations. Networked devices, such as distributed antenna systems (DAS) or private mobile networks, on dedicated jobsite networks provide a better alternative to personal cellular service.

As with the trailer city, an internal network for the GC can be split off for subcontractors, maintaining a separate general Wi-Fi connection for subcontractors. This allows subcontractors to perform their work without accessing the GC's network or files, which typically have specific security rules depending on the type of data center.



Inside Data Halls

Data centers are typically built in three sections, with the smallest designated as the owner's area. This section is commonly the first area to be turned over to the client, which happens while construction continues in the remaining areas. Once an area is turned over, all cabling—both above and below—that is not part of the building's final design must be removed to ensure full independence and compliance with strict security requirements.

However, this does not mean the phases of the building still under construction must go without connectivity. A common solution is to place multiple wireless receiving dishes on the building, which feed into the structure, connecting to multiple strategically-placed switches and APs. This method ensures that the remaining sections stay powered and connected without interfering with or violating owner security protocols, maintaining compliance while keeping the rest of the site connected.

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SCALING CONNECTIVITY FOR 5,000+

The Louisiana Economic Development reported that Meta's upcoming 4-million-square-foot data center campus—its largest to date—will support over 5,000 construction workers at peak activity, all of whom will require reliable internet connectivity.⁵

CONSIDERATION

Project Award Structure

The way a data center construction project is awarded has a direct impact on how connectivity is planned and deployed. Some GCs are awarded projects in a phased approach, requiring flexible, evolving network solutions, while others oversee the entire build from the start, making long-term infrastructure investments more viable. Understanding these differences helps GCs and subcontractors select the right connectivity strategy to support their specific project scope.

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POINT-TO-MULTI-POINT SYSTEMS

A point-to-multi-point (PtMP) wireless system delivers high-speed internet across the entire jobsite, ensuring that all trailers, work zones, and security systems remain connected.

The main broadcasting system is elevated to provide a clear line of sight to all areas requiring connectivity. This setup reduces potential points of failure since each AP receives a direct signal from the tower rather than depending on other APs, commonly referred to as a daisy-chain approach. As a result of the direct signal, if one AP goes down, the rest of the PtMP network remains unaffected and continues delivering uninterrupted connectivity across the jobsite.

As construction progresses, the infrastructure and number of APs expands to support growing bandwidth demands and evolving digital workflows. While the upfront investment is higher, this solution eliminates the need for temporary solutions, reducing recurring costs and delivering a stronger return on investment over time.

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Incorporating connectivity requirements into the competitive bid phase helps ensure the solution stays within budget by establishing a clear understanding of project needs from the outset.

📶 Phased Approach: Adapting Connectivity as the Project Evolves

For projects awarded in stages, the jobsite layout shifts as new phases begin, requiring connectivity to move with it. Wireless APs must be relocated and reconfigured as buildings are completed and new work areas open up. Rather than reinstalling networks from scratch, mobile solutions like wireless bridges, temporary broadband, and PLTE networks can be redeployed to prevent costly disruptions.

📶 Permanent Mini-Tower Approach: Long-Term, Scalable Connectivity

For GCs managing full builds from the start, a permanent mini-tower offers a centralized, long-term solution. Installed at a neutral location with a clear line of sight to the entire project, a mini-tower supports every phase of construction without the need for frequent network adjustments.





CONSIDERATION

Differences in Stakeholder Needs

A data center construction site requires multiple tiers of connectivity to support the diverse needs of project stakeholders. Owners, GCs, and subcontractors each have distinct requirements for network security, bandwidth, and accessibility. Understanding these differences ensures that each group has the right level of connectivity while maintaining security and efficiency across the jobsite.

Long-Term Subcontractors

Subcontractors, such as electrical contractors, are involved throughout the entire construction process, from early-stage builds to final handoff and decommissioning. Relying heavily on tablets, digital tools, and cloud-based applications in the field, they require robust, long-term connectivity.

In many cases, they may join the GC's fiber network or negotiate with the fiber provider to split off a separate fiber strand for dedicated access using the same infrastructure.

Short-Term Subcontractors

Mechanical contractors, and other short-term subcontractors, who work on large-scale system installations require intensive processing power to handle video rendering, 3D modeling, and high-data workloads.

However, since they are only on-site for a limited time, a dedicated fiber build is not cost-effective. Instead, relying on temporary high-bandwidth solutions such as bonded Starlink connections provide the speed and processing power needed during their project phase.

Project Owner

Owners often maintain highly secure, separate networks within their trailers while using the same underlying fiber internet as the GC. A protected infrastructure isolates the owner's network from the rest of the site, preventing unauthorized access.

The level of security required often depends on the type of data being handled, as different security tiers of data centers dictate both virtual and physical restrictions. These restrictions are not just for the final building and often apply during the construction phase as well.



CASE STUDY

ENR TOP 50 CONTRACTOR

ConstructEdge deployed a custom network solution to eliminate bandwidth loss from Wi-Fi meshing and ensure seamless connectivity across the jobsite.

Extending the site's fiber connection and strategically placing over 40 APs provided high-speed internet for all workers and subcontractors, enabling real-time access to BIM models, digital drawings, and mobile devices.

CASE STUDY

ENR TOP 25 CONTRACTOR

ConstructEdge deployed a phased network strategy to tackle early connectivity issues like cellular overages and fiber delays.

A 100-Mbps microwave backhaul, later upgraded to 1-Gbps fiber, provided high-capacity internet to two trailer cities. As the site grew, PtMP wireless bridges provided seamless, high-speed access for workers and subcontractors.

Why Partner with ConstructEdge?

Specialized Experience in Data Center Construction

ConstructEdge brings specialized experience in data center construction, having deployed network infrastructure across 50+ data halls and 3,000+ network nodes. Unlike corporate IT teams that focus on office environments, we are experts in managing the unique challenges of dynamic, large-scale, remote jobsites. Our team understands the complexities of fluctuating jobsite conditions and facilitates consistent connectivity from start to finish.

Seamless Connectivity *Without IT Headaches*

Managing field networks is not a core function of corporate IT teams, yet without a dedicated partner, companies must either rely on internal resources or deploy their own IT personnel to the site. No matter who does the work, the cost remains, whether it's internal labor or vendor expenses. ConstructEdge eliminates this burden by providing full-service network deployment and management, allowing corporate IT teams to focus on the build rather than the bandwidth.

Beyond just deploying the network, ConstructEdge takes on the responsibility of managing and maintaining the infrastructure, including proactive management, equipment tracking, and vendor coordination. Too often, companies attempt to handle hardware procurement themselves—only to misplace critical devices, reorder replacements, and later find the originals, wasting both time and budget.

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Why Partner with ConstructEdge?

Designed for Field Environments

Unlike office environments, jobsites present constant challenges to connectivity. Power fluctuations, accidental damage to equipment, and unpredictable disruptions, such as cables being cut or network gear being relocated, are common.

Corporate IT teams are not equipped to handle these issues efficiently, but ConstructEdge anticipates them. We build resilient solutions designed specifically for field environments, providing proactive threat detection, firewall management, and troubleshooting to ensure networks remain operational without unnecessary IT headaches.

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HIRING VS OUTSOURCING IT TEAMS

The strain on IT resources increases as companies take on larger and more complex projects. Managing jobsite networks requires significant manpower, and scaling internal IT teams to keep up with multiple active jobsites is both costly and inefficient. Companies are forced to either expand their IT staff or reallocate resources, pulling personnel away from core responsibilities.

ConstructEdge alleviates this strain by acting as an extension of the IT team, providing expertise, staffing, and support so that internal teams can focus on strategic priorities rather than troubleshooting connectivity issues in the field.

Flexible and Secure Solutions

Every project has multiple stakeholders, including owners, general contractors, and subcontractors, each with unique network requirements. ConstructEdge delivers customized networking solutions that integrate with various IT policies, keeping jobsite networks secure without interfering with corporate infrastructure. Our managed services include cybersecurity compliance measures and content filtering, removing additional work from corporate IT teams while maintaining jobsite security.

With our expertise, **jobsite connectivity remains fast, secure, and optimized for the field**, enabling construction teams to focus on delivering high-quality projects without disruptions.



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Looking for internet for your data center jobsite?

Experience the ConstructEdge Advantage with our expert team, end-to-end service management, and proactive maintenance.

Get in touch:



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