Eliminating the “Diskless Paradox“ and Building a Zero-Latency Esports Network

Overview

Unlike a typical internet café, the premium esports venue, Isthmian Gaming, serves competitive players who demand high frame rates, minimal input lag, low network jitter, and identical performance across every station. In the world of competitive gaming, millisecond reactions determine the difference between victory and defeat.

To optimize gaming experiences and network environments, GameSync Consulting engineered a Zyxel Networks-powered multi-gigabit architecture that eliminates micro-stutters, prioritizes latency-sensitive gaming traffic, and enables 30 esports PCs to boot simultaneously without lag.

Customer
Isthmian Gaming

Industry
Esports & Gaming

Location
Madison, Wisconsin, USA

Partner
GameSync Consulting

Challenges

“During our soft launch, we noticed our players experiencing micro-stutters and lag spikes in competitive titles like Counter-Strike 2, despite having a pristine fiber connection,” explained Sean Dugan, Owner and Operations Manager for Isthmian Gaming. “We couldn’t afford to compromise on performance – our players demand perfection.”

To identify the bottleneck in the network, Dugan contacted San Diego-based GameSync Consulting, a technology integration firm specializing in low-latency, high-performance networking infrastructure for esports venues and gaming environments.

According to Agragati Siegel, Lead Architect at GameSync Consulting, the primary challenge was a phenomenon identified as the "Diskless Paradox." Because every PC boots from a central server, large bursts of operating system data were being pushed across the network at speeds approaching 10Gbps.

Customer Background

Located in Madison, Wisconsin, the Isthmian Gaming Lounge delivers a competitive gaming experience far beyond what players can achieve at home. The facility features 30 state-of-the-art custom-built PCs, lounge areas equipped with industry’s top consoles, broadcast capabilities, and immersive virtual reality systems. To ensure consistent performance across all gaming stations, Isthmian uses a diskless boot infrastructure, enabling PCs to load operating systems and games from a centralized server rather than local storage devices. This design eliminates performance inconsistencies and ensures every system runs from the same optimized environment.

Zyxel is our go-to vendor because their multi-gigabit switches—specifically the XMG and XS series—deliver enterprise-grade traffic management at an accessible price point.”

Agragati Siegel, Lead Architect
GameSync Consulting

When gameplay packets occurred at the same time, switch ports became saturated, creating micro-bursts, packet loss, and the micro-stutters players were experiencing.

Compounding the issue, the venue’s daisy-chain network topology meant multiple switches relied on a single uplink cable. As more players joined, that link quickly became a bandwidth bottleneck.

Isthmian Gaming required a solution that could prioritize gaming traffic over heavy system files and NDI game captures instantly and automatically, while also supporting high-bandwidth video production for online broadcasts.

Solutions

To eliminate these bottlenecks, GameSync designed a two-phase network architecture that used multi-gigabit hardware from Zyxel Networks.

“When designing high-performance esports infrastructure, you need hardware that offers deep, granular control over packet queues and network topology,” Siegel explained. “Zyxel is our go-to vendor because their multi-gigabit switches—specifically the XMG and XS series—deliver enterprise-grade traffic management at an accessible price point. They allow us to easily prioritize a tiny, latency-sensitive game packet over a massive system file transfer, giving us the exact toolset required to turn a standard LAN center into a flawless competitive arena.”

First, GameSync redesigned the network architecture by deploying the Zyxel XS1930-12F Lite-L3 Smart Managed Fiber Switch as the network core. This new network design replaced the previous daisy-chain design with a star topology, allowing the server, internet gateway, and access switches to connect directly to the core. The result was dedicated high-bandwidth paths and up to 20Gbps of throughput for the diskless server.

Second, advanced QoS (Quality of Service) features in the Zyxel XMG1930-30 Lite-L3 Smart Managed Switches were used to strictly prioritize game data (Priority 7) over server OS data. This created a “VIP lane” for game packets, ensuring latency-sensitive gameplay traffic always moved ahead of large system file transfers.

The transformation was night and day. Now, we can boot the entire room of 30+ PCs simultaneously, and active players don't feel a single lag spike. It's exactly the rock-solid, zero-latency environment we envisioned."

Michael Horst, Owner and Tournament Organizer
Isthmian Gaming

Results

The impact was immediate and measurable. Following the implementation of the Zyxel aggregate topology and QoS prioritization, packet loss was eliminated and ping stability normalized across the entire network. The new network infrastructure allowed the venue to boot all thirty PCs simultaneously without impacting players currently in active matches.

"Using the equipment from Zyxel Networks, we were able to solve the Diskless Paradox," Siegel said. "The granular control over queues and topology provided by Zyxel's hardware allowed us to eliminate buffer saturation completely. The result is a venue where players can compete with absolute confidence in the network."

The 10G backbone enabled Isthmian Gaming to introduce 4K video production and NDI streaming alongside gameplay traffic. The result is a rock-solid, scalable esports network that positions Isthmian Gaming years ahead of typical gaming venues.

"The transformation was night and day," explained Michael Horst, Owner and Tournament Organizer for Isthmian Gaming. "GameSync completely restructured our network core using Zyxel's multi-gigabit switches, completely eliminating the invisible bottlenecks. Now, we can boot the entire room of 30+ PCs simultaneously, and active players don't feel a single lag spike. It's exactly the rock-solid, zero-latency environment we envisioned."

- Eliminated micro-stutters and packet loss
- Stable ping times across all gaming stations
- 30 PCs can boot simultaneously with no gameplay impact
- 10GbE core architecture with scalable bandwidth
- Supports 4K broadcast production and NDI streaming

Product List

- WAX650S WiFi 6 Access Point

- XS1930-12F Lite-L3 Smart Managed Fiber Switch
- XMG1930-30/30HP Lite-L3 Smart Managed Switch
- XGS1930-28 Lite-L3 Smart Managed Switch

- USG FLEX 700H Firewall