□□ Enhancing Wireless Video Surveillance Networks with mmWave and 802.11ad/ay (60GHz) □□ for Unmatched Reliability □□



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Is your wireless video surveillance network struggling with interference-related outages or lagging due to limited bandwidth? Are you considering deploying a CCTV network with wireless backhaul but unsure of the best approach?

While fiber optics have long been the go-to solution for security installations, they’re not always practical, especially for certain new and existing deployments. Even the widely used 5GHz wireless spectrum may not meet today’s growing demands. With the rapid advancements in edge technology, the need for a robust and reliable network infrastructure has never been more critical. Fortunately, recent developments in wireless technology have introduced multi-gigabit capable

links within virtually interference-free spectrums, offering an attractive alternative.

Understanding the Need for Reliable Video Surveillance Connectivity

Reliable video surveillance connectivity is essential for a diverse range of users, including government agencies, municipal councils, venues, and parking management businesses. System Integrators (SIs) who design and implement these networks must ensure they deliver consistent and dependable performance.

SIs are typically involved in all phases of network deployment—from sales and installation to maintenance. However, wireless technology may not always be their primary expertise, which can lead them to seek external guidance for planning, designing, and deploying the necessary wireless infrastructure. This is where understanding the nuances of wireless technologies and their application in video surveillance becomes crucial.

Why Reliable Connectivity is Critical for Video Surveillance

In video surveillance deployments, reliable wireless connectivity is non-negotiable. Unfortunately, many networks are poorly designed, often failing to account for interference, particularly in those using the 5GHz spectrum. While 5GHz or even 2.4GHz radios can be effective under certain conditions, they are frequently inadequate in high-density urban environments.

Take Smart Cities as an example—these urban centers are increasingly adopting video surveillance as a key component of public safety, deploying more cameras each year. Many of these cameras are high-definition (HD) 4K or PTZ models, which require stable, high-capacity connections to ensure optimal performance. In such scenarios, maintaining video quality with no dropped frames, low latency, and minimal jitter is paramount.

Legacy Wireless Technologies and Their Limitations

Historically, sub-6GHz wireless spectrums like 2.4GHz and 5GHz have been widely used in video surveillance networks. These networks can support hundreds of Megabits per second, which may be sufficient for standard and even HD resolution cameras in less congested areas. However, two significant challenges often arise:

1. **Interference**: The 5GHz WiFi band is now pervasive, leading to increased interference levels. In environments where multiple WiFi access points compete for the same frequency, the reliability of video surveillance connectivity can suffer—this is simply a matter of physics.
2. **Increasing Demand**: The trend toward higher resolution cameras (e.g., 4K), faster frame rates, and full PTZ functionality has significantly increased bandwidth requirements. For example, a standard 4K camera operating at 24fps can consume anywhere from 10Mbps to 40Mbps. In scenarios where multiple cameras are deployed at a single location, the cumulative bandwidth demand can quickly exceed the capacity of traditional WiFi point-to-point bridges, making mmWave solutions more suitable.

The Role of 802.11ad/ay (60GHz) in Video Surveillance

As video surveillance networks evolve, the adoption of 802.11ad/ay, operating in the 60GHz spectrum, is becoming increasingly relevant. These standards are designed to deliver multi-gigabit wireless connections with low latency, making them particularly well-suited for high-definition video surveillance.

The 60GHz band, utilized by 802.11ad and the enhanced 802.11ay, offers a significant advantage in environments where interference from other wireless technologies is a concern. Due to its high frequency, the 60GHz spectrum experiences minimal interference and is capable of providing high-capacity links ideal for video surveillance applications requiring substantial bandwidth.

Ensuring Reliable Wireless Video Surveillance Connectivity

When planning and designing wireless networks for video surveillance, reliability must be a top priority. Whether you’re considering sub-6GHz technology, 802.11ad/ay (60GHz), or higher-capacity mmWave systems, it’s important to select technologies that are proven to deliver consistent, dependable performance.

While fiber optics are renowned for their speed and security, they are not always available in every required location, particularly across sprawling urban areas or large corporate campuses. In these cases, the right wireless network can extend the benefits of fiber, providing a secure, reliable connection without the associated costs and installation delays.

Thanks to significant advancements in wireless technology, concerns about using wireless for surveillance networks are increasingly being put to rest. Today’s wireless solutions offer not only reliability and ease of installation but also cost-effectiveness and high levels of security.

Comparing Connectivity Solutions for Video Surveillance

Fibre Optics

- **Pros**: Secure, Multi-Gigabit Capacity
- **Cons**: Expensive, Slow Deployment, Complex Installation

mmWave Wireless (Including 802.11ad/ay)

- **Pros**: Virtually Interference-Free, Rapid Deployment, Secure, Affordable, Very Low Latency, Multi-Gigabit Capacity
- **Cons**: Limited Range in Non-Line-of-Sight (NLOS) Environments

Sub-6GHz Wireless

- **Pros**: Low Cost, Quick Deployment, Long-Range Availability
- **Cons**: Limited Capacity, Susceptible to Interference, Higher Security Risks

The Role of Fixed 5G in Video Surveillance Connectivity

5G technology, known for its high speed, low latency, and broad spectrum availability, is perfectly suited to meet the needs of video surveillance networks. It supports the gigabit capacities required for modern surveillance applications and can simultaneously accommodate additional services such as Public Wi-Fi, healthcare facilities, intelligent traffic systems, and other city services demanding reliable, high-throughput connections.

Solutions operating in the 60/70/80 GHz bands, such as those enabled by mmWave technology, can effectively extend your video surveillance network to areas where fiber is not available, ensuring projects are completed on time and within budget.

To reiterate, mmWave wireless radios operate in spectrums that are virtually free from interference. This advantage stems from the unique characteristics of mmWave signals, which utilize narrow beams allowing for spatial separation. Even in dense environments with multiple radios in close proximity, performance remains stable and unaffected.

The 60/70/80 GHz spectrum offers a total of 24 GHz of bandwidth—significantly more than the 450 MHz available in the 5 GHz spectrum. This extensive frequency diversity ensures that mmWave systems remain resilient against interference, making them a robust choice for high-demand video surveillance networks.

Key Takeaways for Effective CCTV Networks

- **Rapid Deployment**: Wireless installations can be completed swiftly, often in under a day, depending on the project.
- **Fibre-Like Performance**: Achieve multi-gigabit capacities and reliable performance without the complexity of fiber installation.
- **High Security**: Benefit from the narrow beam technology and robust encryption protocols.
- **Unmatched Reliability**: Aim for 99.999% network availability to ensure continuous surveillance coverage.
- **Comprehensive Support**: Consider fully managed services and ongoing support to maintain network performance.

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