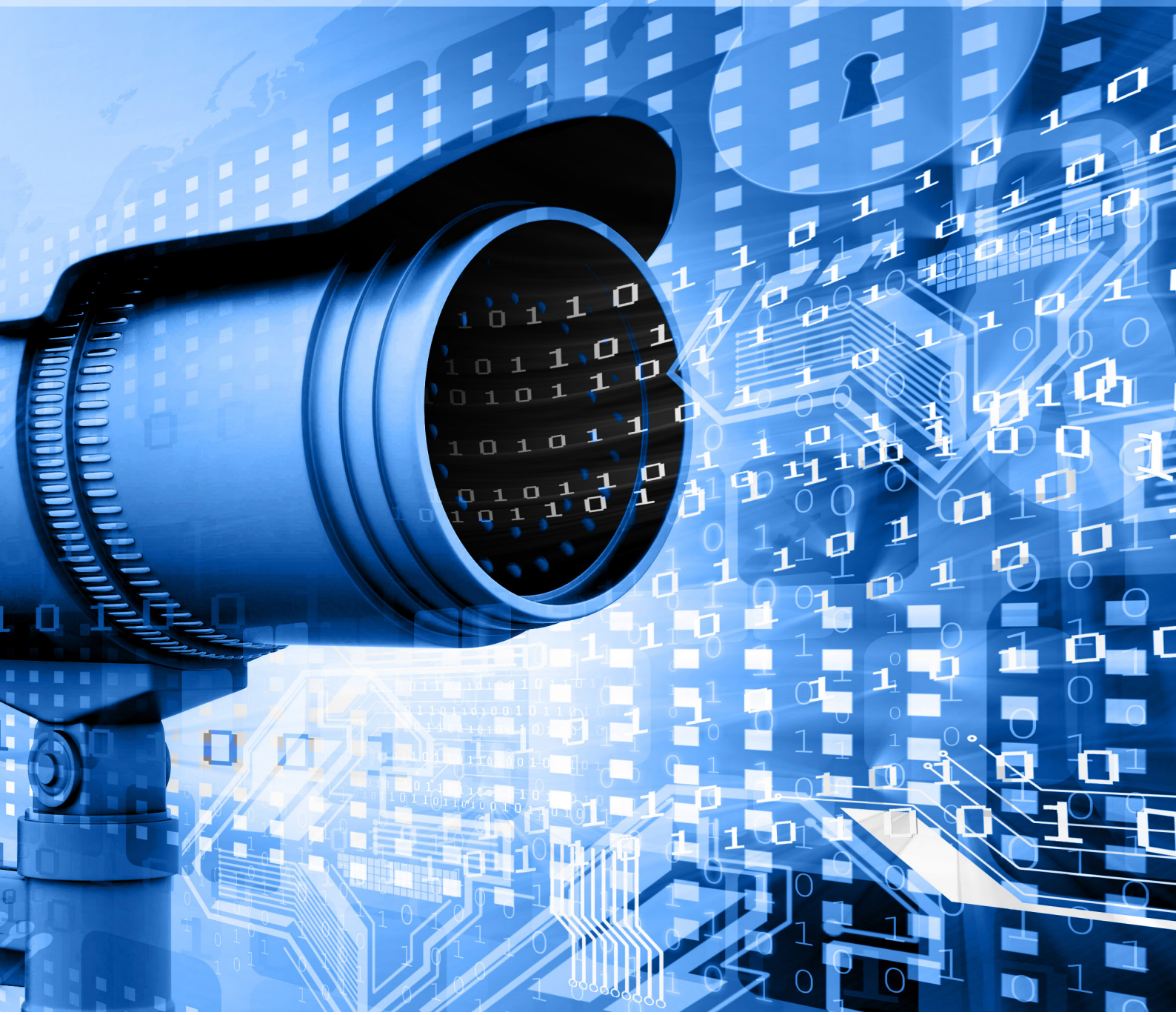


Shortest Path Bridging for mission-critical video surveillance networks

White Paper
SPB for mission-critical video surveillance networks

Alcatel·Lucent
Enterprise

Video surveillance Overview

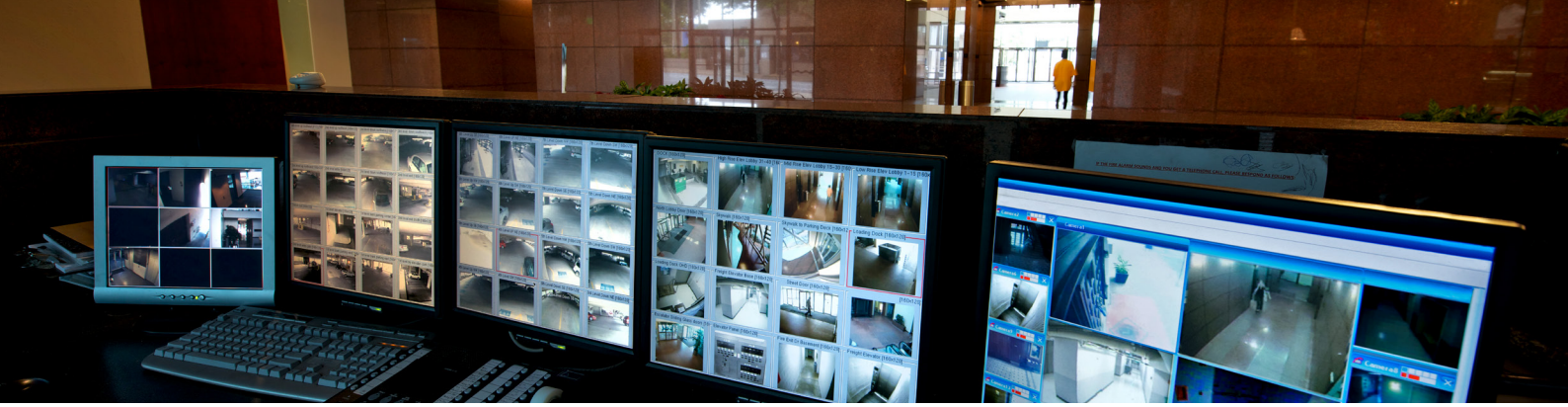
The market for dynamic video surveillance is evolving and growing rapidly. A 2018 report from Technavio suggested that the global video surveillance market will post a CAGR of 11% over the next five years (2018-2022)[1]. In the early days, video surveillance was made up of analog encoders and existing analog cameras. Today, video surveillance consists of multi-sensor, multi-focal, 360-degree cameras.

Research shows that when things go wrong in a surveillance situation, 75% of the time the failures are attributed to network related issues such as network resiliency, resulting in blurry video and lapses in footage during recording or playback. From an emergency response perspective, where seconds equal lives, this is not acceptable.

Bandwidth is the most fundamental element of computer networking for video surveillance systems. Video surveillance can consume a tremendous amount of bandwidth and variations in surveillance camera bandwidth loads can be significant.

This white paper addresses how and why Shortest Path Bridging (SPB) is the technology of choice for video deployments to ensure consistent quality of video especially when there are network failures.

[1] https://www.businesswire.com/news/home/20180807005739/en/Global-Video-Surveillance-Market-2018-2022-Post-CAGR



What you need to know about SPB

SPB networking technology has been standardized by both the Institute of Electrical and Electronics Engineers (IEEE) and the Internet Engineering Task Force (IETF), published as 802.1aq and RFC 6329, respectively. ALE supports the SPB-M (MAC-in-MAC) mode of the 802.1aq standard. ALE does not support the SPB-V mode, therefore, mentions of SPB throughout this document refer to SPB-M.

SPB uses a complete picture of the network to ensure that IP traffic takes the shortest path possible to reach its destination. SPB capable nodes can calculate and use multiple available paths and when required, dynamically adjust to changes, making network virtualization easy – even in a multi-vendor enterprise environment.

Known as “multi-path routing”, this technique offers built-in fault tolerance, dynamic bandwidth allocation and enhanced security. It uses all network resources to reduce, or even eliminate network bottlenecks. Redundant links no longer sit idle and are available for utilization.

SPB Benefits

IEEE standards-based protocol: Ongoing development and improvement by IEEE body

Improve network performance: Seamless, sub-100 milliseconds network convergence

Security: Multi-tenancy support with virtual private networks for any entity

Eliminate network limitations: Overcome legacy network limitations, such as the number of VLANs deployed in the network

Efficiency: Eliminate loop prevention protocols and blocked links; all links forward traffic

Versatility: Technology can be deployed throughout the network including campuses, data centers, and remote locations

Flexibility: Applicable for any type of enterprise organization, as well as verticals such as education, transportation, hospitality, healthcare, and government

Efficient operations: Save IT time and effort by dynamically building and maintaining the network infrastructure, as well as virtual private networks topologies between nodes

Reduce human errors: Automatic configuration preserves plug-and-play capabilities

Easy network expansion: No limitation on number of nodes that can be deployed in the network

Simplify network changes: Add, change, remove, elements of the network without impacting the existing network and services

ALE and SPB

Video surveillance systems can be very complex and require high-level video surveillance networking knowledge. The ALE video surveillance solution delivers pre-defined configurations and takes the complexity out of network setup, providing security system integrators requiring minimal resources, with a streamlined deployment process for faster video surveillance equipment configuration, and management tools.

The network core and aggregation include high-performance wire-rate 10 GigE/25 Gig/40 GigE/ 50 Gig/100 GigE network switches that provide high port density and switching capacity. The ALE powered SPB solution includes the market-leading Alcatel-Lucent OmniSwitch® 6900 Stackable LAN Switch family which comes in a compact 1U form factor, the OmniSwitch 6860 Stackable LAN Switch, the OmniSwitch 6865 Hardened Ethernet Switch, and the versatile OmniSwitch 9900 Modular LAN Chassis.

The ALE solution combines SPB and Virtual Chassis (VC) technologies to create a friction-free network. This network enables faster, easier information sharing among organizations, departments, or branch offices allowing them to send and receive data without the constraints of traditional enterprise networks. VC technology enables multiple Stackable LAN Switches to be combined and behave as a single fully redundant unit. In many cases this is an affordable alternative to chassis-based switches, as it requires less space and power, can be deployed at a lower cost, and provides reliability.

Core products incorporate the award winning Intelligent Fabric (iFab) technology that offer a set of capabilities, including automation techniques that simplify installation, configuration, deployment, and operation of the network.

Intelligent Fabric (iFab)

SPB technology can automatically be deployed as part of ALE iFab technology. iFab simplifies network operation, offering self-configuration and self-attachment. iFab also provides high performance, resiliency and flexibility. Self-configuration reduces the amount of time required to establish connections between nodes. When new equipment is added and cables are connected, new devices are automatically detected. The network is auto configured and operational in just a few minutes. Making moves, adds, and changes is also much easier. This avoids the need to have IT personnel with specific expertise for new equipment installations. In networks with iFab, performance and resiliency are both improved as it leverages SPB (Shortest Path Bridging) technology.

ALE uses shortest path bridging with minimal network convergence time during failures, eliminating blurry video and lapses in video footage. This is especially important for mission-critical video surveillance systems.

SPB addresses various limitations in Spanning Tree Protocol (STP) based Ethernet networks. But SPB is not just the evolution of STP. Like Multiprotocol Label Switching (MPLS), SPB provides virtual private network (VPN) functionality yet is simpler to deploy and maintain, resulting in a lower total cost of ownership (TCO). It is for this reason that SPB is increasingly being considered as an alternative to MPLS.

Common drivers of video bandwidth consumption

Resolution: As image resolution increases, so does the required bandwidth

Frame rate: As frame rates increase, bandwidth requirements increase

Scene mobility: The more movement in a scene, the more bandwidth is required for better resolution

Low light: Darker scenes, require more bandwidth for better resolution

Model variations: Some models, depending on imager or processing, can consume more or less bandwidth

Smart Codecs: Allow cameras to intelligently adapt compression for significant bandwidth reduction

Mission-critical video surveillance requirements

Virtualization

SPB VPNs enable secure segregation and bandwidth allocation so that video traffic is isolated and performance requirements are met.

Resiliency

SPB networks can deliver the required level of availability through protected, end-to-end control-plane signaled paths with fast convergence times in any topology.

Operations and maintenance

SPB networks are simple to operate and maintain because they use a single protocol (IS-IS) at the control plane as opposed to a protocol stack (for example: BGP/LDP/OSPF). IS-IS builds shortest path trees, distributes service membership information and carries service routes through the backbone.

The ALE iFab technology brings further simplification with plug-n-play and auto-attachment and auto-configuration capabilities.

Artificial intelligence (AI) and analytics

The future of video technology is moving not only toward AI, but also toward analytics. From a network and analytics perspective, the changes are going to be dynamic, affecting critical services, with respect to city-wide surveillance and smart cities.

Video solutions must provide geographic positioning and wireless signals to detect first responders' location, determine where their nearest cameras are located, and automatically populate those cameras with images within a building where there may be an emergency situation.

Simplified deployment

Simplifying deployment is also important. For example, with a Service Defined Network and a plug and play camera, when a camera goes down at three in the morning, you don't usually have a network expert, an architect, or an engineer to fix the problem. With iFab and SPB, all you'll need is someone who can replace the camera and the network can dynamically drive the configuration it needs. It can assign the appropriate VLAN, provision the resources, and get it up and running without having to call the video surveillance IT team.

Mission-critical video surveillance in industries

In today's fast-paced world, where seconds save lives, organizations worldwide are choosing mission-critical SPB video surveillance infrastructure. The right video surveillance solution can deter vandalism and theft, and provide tools such as remote monitoring to address incidents before they escalate. It is also a key tool for apprehending criminals or preventing malicious activities.

Government

Data-driven solutions are emerging that transform everyday video content into the security and operational intelligence that urban areas need to become smart cities. Governments require best-in-class SPB video surveillance solutions to improve:

- Urban planning and traffic optimization
- Real-time alerts and incident response
- Community policing and citizens' confidence

Healthcare

Video surveillance systems provide an efficient, cost-effective solution with 24/7 coverage of physical surroundings, improving safety and increasing operational efficiency. In the healthcare industry video surveillance can:

- Increase patient and staff safety
- Reduce theft of drugs and life-saving equipment
- Improve security of personal property and data

Education

Violence in schools has become a real threat that can't be ignored, which is why video surveillance is so crucial in schools, campuses, academies, and other learning institutions. Benefits of school video surveillance include:

- Preventing trespassers from entering school property
- Deterring students from acting out/misbehaving
- Ensuring safety of staff, teachers, and school administrator

Transportation

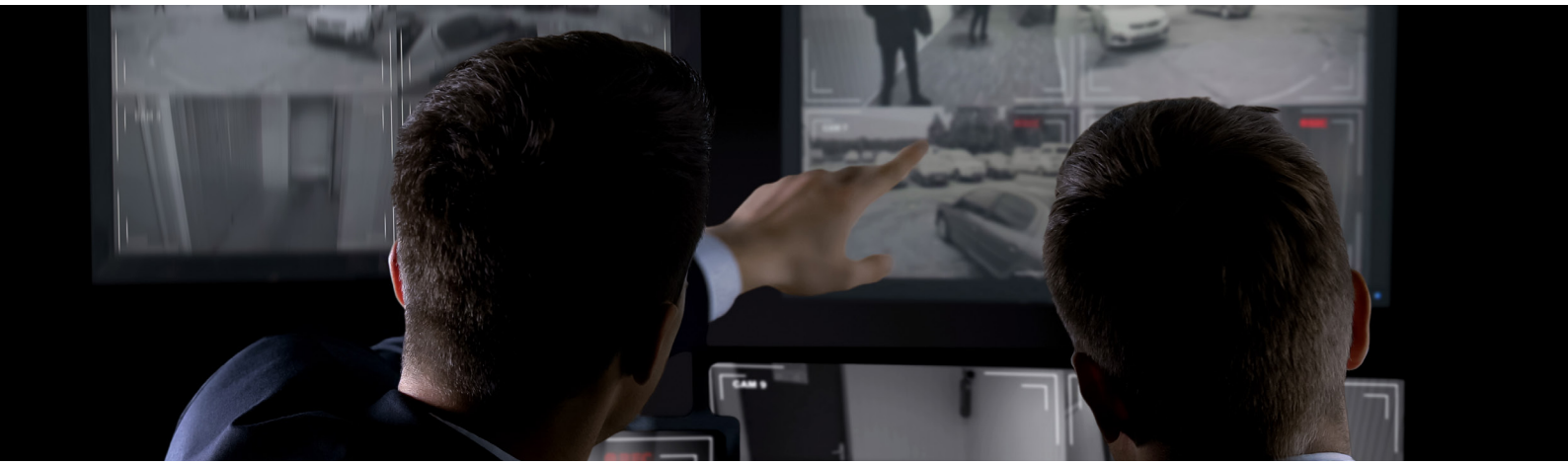
Video surveillance systems in the transportation industry provide robust security camera solutions for mass transit systems, ports, subways, city buses, and train stations. Benefits of transportation video surveillance include:

- Preventing vandalism
- Creating safer environment for passengers
- Reducing liability in cases of passenger injuries

Hospitality and Gaming

Video surveillance is required for the day-to-day security threats faced by the gaming and hospitality industry. Video solutions can help reduce threats such as theft, vandalism, and other crimes, while also facilitating public safety. Video surveillance in hospitality offers the following benefits:

- Improved patron and staff safety as well as better crowd control at high-traffic events
- Effective tool for monitoring daily operations
- Improved customer service
- Reduces business liability



ALE delivers performance and security

ALE powered SPB for mission-critical video surveillance offers lower total cost of ownership, supports faster convergence times and improves efficiency by allowing traffic to load-share across all paths of a mesh network. It delivers the performance, analytics, and security with Internet of Things (IoT) containment, offering a superior video surveillance solution. Contact us to learn more about ALE SPB solutions for video surveillance.

Alcatel·Lucent Enterprise