Trilliant

The Smart City Untethered: Video Solutions for a Modern World

A B S T R A C T

Trilliant empowers municipalities, governments and other organizations around the globe to introduce operational efficiencies and provide improved services to their citizens and customers. The Trilliant Communications Platform is purpose- built to securely and reliably deploy any application on one powerful network. The Trilliant Platform is deployed across large industries, cities and municipalities, and airports, who use it to consolidate vital functions on to one network, lower operating costs, and to scale with new smart city applications as they become available. With the most field-proven, globally compliant solution in the market, Trilliant empowers you by connecting the world of things®.

Benefits of Mesh Network Solutions for Video:

- *Deploys quickly*
- *Supports rural areas, and areas with limited infrastructure*
- *Highly scalable*
- *Analytics provide meaningful insights from data*
- *Delivers exceptional quality of service for video and voice over IP (VoIP) applications*
- *Lowers costs with extended range*
- *Supports multiple, concurrent applications over the 5GHz band*
- *Protects the privacy and integrity of all traffic traversing the mesh network*
- *Provides a private network with no recurring telecommunications fees*

SecureMesh® WAN

Head-End System

Stringent Security

Video Surveillance

Introduction

As computer chips become cheaper and more powerful, this unleashes opportunities to make cities more livable, cleaner, quieter, and safer. Sensors and video devices can now track things at all points of a city that were previously not being monitored like real- time individual or object tracking, air and water quality, noise, and even empty parking spaces. It's also possible to reduce electricity expenditures by remotely controlling streetlights. All of these things and more can be sensed and controlled with evermore tiny, smart, and inexpensive devices.

Video Surveillance Anywhere

Video services are one of the more high-value smart city applications. Today's video systems are more useful than ever, they encompass much more than traditional surveillance, they enable real-time video and audio analytics, image processing, and intelligent machine monitoring and alerts. These applications demand consistent high-quality real-time and recorded video which require a network that has a high bandwidth capacity. In many places, laying fiber for these networks is cost-prohibitive or impossible due to digging regulations. But, with a scalable, wireless mesh network, many of these traditional problems are resolved.

The versatility, carrying capacity, and scalability of Trilliant wireless mesh networks makes them ideal to transport video applications. The Trilliant wireless mesh solution is a self-forming, self-healing network that requires no separate wiring, or costly subscription services. It is a long-haul RF solution that can securely transport data all the way to a data center or ISP point, ensuring everything comes through to the head end system. The broadband mesh has the throughput and scalability required to handle numerous cameras, along with the reach needed to cover large geographies. And because the mesh topology automatically creates multiple paths among the many nodes, the network provides the requisite mission-critical reliability.

The wireless mesh network affords many additional advantages. Without wires, the network is considerably faster to deploy, and much less expensive to install, operate and maintain.

There are virtually no restrictions on camera placement, each can be moved easily. In fact, the entire network can be relocated to another site, allowing for "temporary" deployments that are perfect for construction sites, disaster recovery, special events, etc.

Third-generation Mesh Networking From Trilliant

Trilliant's third-generation, multi-radio 5 GHz Synchronous Mesh Network system maximizes the many benefits of using a wireless mesh network for video surveillance. The advanced SecureMesh® architecture, with its use of a directional antenna arrays and mesh-wide traffic synchronization, gives the Trilliant solution its industry-leading performance and scalability, enabling cameras to be deployed cost- effectively throughout large geographies. Unlike point-to-point and point-to-multipoint topologies, the superior non-line-of-sight (NLOS) coverage allows the Trilliant mesh to operate dependably and affordably in even the most challenging urban or rural environments.

Where required, the extended range of the Trilliant solution (up to 10 miles or 16 kilometers) allows cameras to be placed in areas well beyond the reach of most other camera systems.

In a typical deployment, the Trilliant wireless mesh network conveys video feeds from the many digital cameras to a centralized location where scenes can be monitored in real-time and recorded on specialized video servers. Using Trilliant's solutions, cameras can be deployed literally anywhere. At any location requiring a camera, a mesh node is installed to attach the camera using a short Ethernet cable.

Special converters are even available to interface legacy analog CCTV cameras to the digital mesh network.

A Full-fledged Multipurpose Network

While it is common practice to devote a mesh network exclusively to video surveillance, the Trilliant

solution readily and securely accommodates additional applications. Such multi-service municipal wireless networks are often used to provide public Wi-Fi Hot Zones, broadband Internet access, and other remote monitoring or metering applications. Built-in security features, including access controls, authentication and traffic encryption, protect both the privacy and integrity of all video, voice and data traffic traversing the Trilliant mesh network. For an additional layer of security, if desired, the Trilliant solution permits the creation of Virtual LANs (VLANs) devoted exclusively to each separate application.

Perhaps the most significant advantage of the Trilliant solution, though, is its unique ability to manage traffic with a deterministic quality of service (QoS). Features like traffic filtering, shaping and prioritization combine to ensure that each application is assigned an appropriate quality of service. Real-time video feeds, for example, demand a consistently high level of throughput. By contrast, voice traffic consumes much less bandwidth, but requires very low latency (delay) and jitter (variations in latency).

With its comprehensive and centralized traffic management capabilities, the Trilliant solution adapts easily to changing needs and priorities.

By establishing a wireless network backbone, cities are presented with many technology options for the future. As rapid advances in technology bring down the prices of sensors and other IoT devices, an already-in-place network can speed the implementation of services not yet even dreamed of.

To learn more about third-generation wireless mesh networking with the Trilliant SecureMesh® Network solution, please visit Trilliant on the Web at trilliant.com/platform/networking-technology-wan/

Figure 1

● SecureMesh® NAN ● Trilliant SecureReach®
Low Power Wide Area Network (LPWAN) ● SecureMesh® WAN

The Ideal Platform for all your Applications

Trilliant's platform is purpose-built to handle multiple concurrent data streams, including high bitrate video all the way down to short data bursts from internet of things devices.

The Trilliant solution installs quickly, with no costly fiber excavations, allowing for little to no traffic disruptions and a process that circumvents lengthy permit delays. Trilliant's inexpensive endpoints and relay devices ensure that your total cost of ownership (TCO) is low to get started and low to add new applications as you grow.

Cities can direct data streams to multiple consumers and are given complete control over who can access the data. In addition, you can:
• Process your data with your choice of software.
• Use your own cameras, or IoT devices, or mix them depending on the application.
• Develop custom, locally compliant solutions.

Video Services for a Variety of Applications

Traffic Analysis
• Count cars for traffic analysis.
• Detect traffic patterns for traffic light synchronization.
• Validate road improvement budgets.
• Identify areas for speed enforcement.
• Move equipment for new studies.

License Plate Recognition
• Send alerts for flagged vehicles.
• List vehicles in a selected vicinity.
• Validate authorized entry to parking lots and garages.
• Analyze parking use patterns.
• Combine with surveillance apps.

Crowd Surevillance
• Monitor large gatherings.
• Flag behaviors such as running or sounds such as gunshots.
• Facial recognition processing.

Building Monitoring
• Observe entryway queues.
• Confirm social distancing and protective coverings.
• Switch to night-time motion detecting, recording and alerts.

Facial Recognition
• Perform facial recognition on strategic entry points.
• Flag specified IDs.

Construction Site Surveillance
• Remotely view whether workers are wearing required safety equipment.
• Reduce theft.
• Portable. Move to next site or change views.

Centralized Video Database with Access Control
• Set access for web-based users or to a dedicated control room
• Issue persona-based privileges, or provide custom privileges tied to an ID.

Trilliant

Products

Trilliant's WAN Technology

SecureMesh WAN is Trilliant's broadband network layer. In other applications it can provide backhaul connectivity for Trilliant SecureMesh NAN and SecureReach LPWAN technologies.

The WAN network is based on IEEE 802.11n standards and supports peak rates up to 270 Mbps. In video applications it can provide a mesh link network for wireless video and CCTV services.

This solution provides a cost-effective alternative to cellular backhaul.

Features

- Low Latency, High Bandwidth • Air data rates up to 270 Mbps • Latency < 10 ms per hop
- Operating Frequency range is 5.25 to 5.8GHz
- Antenna pattern switching supports frequency planning and mitigates interference
- Power requirement for all devices is via POE

Design Team Assistance

Trilliant also offers a flexible and open approach to network design and can collaborate with other public/private networks where it is appropriate.

Network Topology:

Multiple Overlay Options
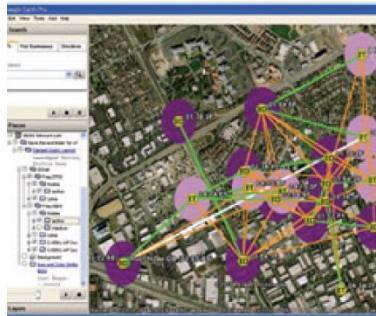
Network topology map showing the locations of Trilliant SecureMesh devices.

System auto-generates the map using GPS information.

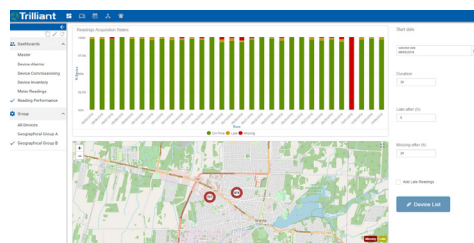Overlays can indicate signal strength and associations between nodes.

Color Coded Severity Levels and Event Filtering

Custom Alarm Prioritization

Performance Monitoring Metrics

Detect service patterns and connect events to specific times.

User-friendly Interface
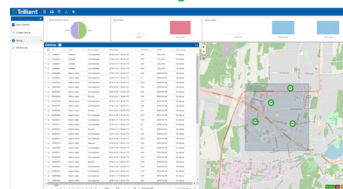
- Multiple system users with different privileges.
- Secure Web access with credentials.
- Searchable video archive.
- Open platform enables add-on products, such as analytics and face recognition.

401 Harrison Oaks Blvd, Suite 300
Cary, NC 27513
www.trilliant.com