PATTON

Visuality™
SOLUTIONS

FOR ENHANCED, REAL-TIME SITUATIONAL AWARENESS

AWARENESS

COLLECTION

SURVEILLANCE

INTELLIGENCE

DISTRIBUTION

Patton's Visuality™
Mobile Video Surveillance Solution

Visuality is a next-generation integrated and fully mobile surveillance, collection and intelligence distribution solution.
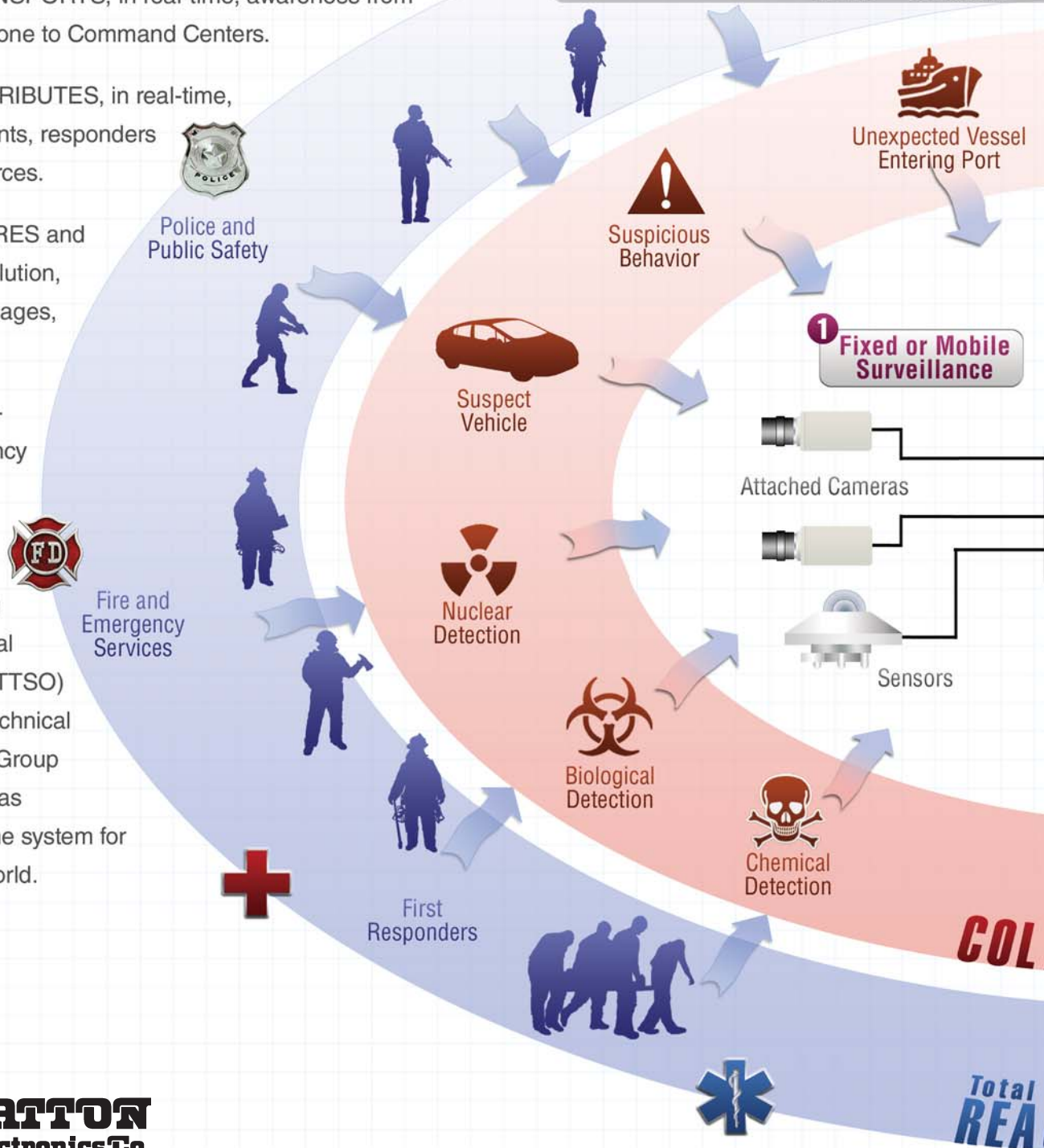
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Visuality—The Big Picture

Visuality is a one-of-a-kind surveillance, collection and intelligence distribution platform.

1 Visuality INGESTS audio, video and "sensor" data from mobile (vehicles) or stationary locations.

2 Visuality TRANSPORTS, in real-time, awareness from the surveillance zone to Command Centers.

3 Visuality DISTRIBUTES, in real-time, awareness to agents, responders and/or reaction forces.

4 Visuality STORES and records, high resolution, forensic quality images, sounds and data.

Designed for inter-service, inter-agency and international requirements of the US Government's Combating Terrorism Technical Support Office (CTTSO) and the related Technical Support Working Group (TSWG), Patton has commercialized the system for use around the world.

Workstation   PDA   Cell Phone   In-vehicle monitors

Police and Public Safety

Unexpected Vessel Entering Port

Suspicious Behavior

Suspect Vehicle

1 Fixed or Mobile Surveillance

Attached Cameras

Nuclear Detection

Sensors

Fire and Emergency Services

Biological Detection

Chemical Detection

First Responders

COL

Total REA

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3 **Wired & Wireless Video, Audio & Data Distribution**

BlackBerry **Laptop**

T7900
Command Server

2 **Wireless Real-time Audio, Video & Data Transport**

T7714

4 **High Resolution Forensic-Quality Storage**

Attached Cameras

Sensors

VISUALITY™

LECT & SURVEIL

Situational Awareness

CT & RESPOND

Armed Combatant

Recognized Threat

Unexpected Suspicious Object

Road Obstruction

Field Agents

Special Operations & Tactics Teams

SWAT POLICE

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5

One System, Many Personalities

Mobile

Man-Portable

In this scenario, Visuality has been deployed in a surveillance vehicle tasked with maintaining crowd safety. Onboard cameras have detected a suspicious bag carried by a protestor. The images are sent to the headend facility for evaluation. There it is determined that the bag poses a potential threat.

A field agent equipped with the man-portable version of Visuality, uses images sent by the headend facility to his cell phone to identify the suspect in the crowd. He then notifies the headend facility that the suspect has been located.

Other field agents, made aware of the threat by the headend facility, help apprehend the suspect.

Mobile Video Surveillance Platform
Field platform designed for manned and unmanned vehicles. Ideal for installation under seats.

Manned Mobile Surveillance Platform
Ultra miniature platform designed for covert transport in backpacks or bags.

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Airborne

Portable/Covert

The apprehended suspect's bag contains components for making fire bombs. He informs police that agitators will use incendiaries to disrupt the demonstration. The alert is sent via Visuality. When violence erupts, the airborne version of Visuality is able to pinpoint where agitators, in an attempt to set off a riot, are throwing fire bombs.

Using the locations provided by airborne Visuality, the headend facility uses nearby, covert Visuality systems (in this case tree-mounted and rooftop-mounted) to identify the agitators responsible for the violence. Provided with this information, law enforcement is quickly able to arrest the perpetrators.

Airborne Surveillance Platform
Rack system for installation in manned or unmanned avionics applications.

Fixed and Portable Surveillance Platforms
Compact, weather-proof platforms designed for long-term, all-weather, 24/7 surveillance.

The Case for Visuality

The emergence of global terrorism has resulted in countermeasures by governments designed to protect life and property, and to serve justice. It has spawned new markets and driven industry into fielding new technologies in order to detect, thwart, and respond to attacks and prosecute offenders. These new technologies and capabilities are being commercialized to bring new efficiencies, profits and protection to the undertakings of governments and the private sector.

The video surveillance industry is undergoing strong growth in demand worldwide with the increased need for securing and protecting personnel, populations and property. The operation and protection of government, business and critical infrastructure, and related persons is changing and challenging in our time:

- The world is "getting smaller"
- Problems are global
- As units and teams, we are geographically dispersed
- We are increasingly mobile

As a result, it's becoming essential that surveillance systems evolve into intelligent, integrated and "networked" systems delivering digested surveillance, collection and intelligence to responders of all sorts in dispersed locations. This evolution includes adding mobility, supervision, analytics and distributed-awareness to "surveillance" systems.

These days, IP-based technologies are ubiquitous. With the arrival of numerous wireless technologies, broadband access to IP networks is becoming universally available and economical. Today's technology makes it possible for video, audio, GPS and a variety of sensor data from anywhere be available to any user anytime using any IP-enabled device (workstations, laptops and hand-held devices). Patton will show you in this guide how AWARENESS can be propagated

securely, in real-time, with mobility, redundancy, and flexibility to be delivered in any situation.

Today, security and intelligence-gathering solutions based on closed-circuit television (CCTV), digital video recorders (DVRs), and IP cameras are disjointed and "under-integrated" systems. They do not adequately leverage IP-based technologies or the Internet to address the emerging needs in the security market space. Current market needs imply that users must access video, audio and data surveillance networks which are not just stationary. They must be fully mobile and portable in nature. They must provide real- or near-real-time sensory inputs, collected from a collection of mobile vehicles and stationary locations. Such inputs must be aggregated at a central location in real-time with the goal of providing a cognitive reaction to a condition or event. These networks require integration with analytics and sensor data analysis and the ability to "push" information to mobile users for the purposes of reaction and response.

Integrated and mobile surveillance systems designed to provide the full scope of vehicular and real-time situational awareness differ dramatically from any other surveillance solution in the market.

Patton has been on the front lines of developing technologies and solutions to address these needs through technology development relationships with the US Government's Combating Terrorism Technical Support Office (CTTSO) and the Technical Support Working Group (TSWG). CTTSO and TWWG are standalone inter-service, inter-agency and international working groups that conduct R&D programs for combating terrorism. TSWG is a user-driven organization tasked with rapidly developing the newest technologies for war fighters and first-responders to combat terrorist activities. TSWG operates across the four pillars of combating terrorism: antiterrorism, counterterrorism, intelligence and consequence management.

Patton has developed—to TSWG requirements—the next

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generation of integrated surveillance, collection and intelligence distribution solutions. Patton's Visuality™ is the result. We are leading the way with a set of technologies which addresses the market needs of today and the future supporting the following critical capabilities.

Mobile (Vehicular) Awareness and Wireless Network Integration

In order to facilitate mobile and "portable" surveillance, next-generation systems need to support classical and ubiquitous wireless infrastructure based access networks including cellular data networks. However, offered and "achievable" throughput rates on these networks vary greatly. In order to avoid packet loss, any real time system has to account for the high variance in uplink rates. It also has to consider rate changes and round trip delay on the link, and compensate for weaknesses in industry standard motion-compensated compression (H.264). Patton has developed unique adaptive rate control algorithms to ensure high quality video is delivered in real time to command centers over even the worst wireless networks.

Shared Situational Awareness Universal Access

Commanders, agents, and responders need to be able to configure, view and analyze live video and "awareness" data from wherever they are and for whatever mission. Using a private IP network or the Internet, users require the benefit of access to raw video, data and/or digested intelligence delivered from the platform. Mobile phones and PDAs are ubiquitous and are more easily accessible than computers. IP Multicast enables easy access to all users through the Patton Command Server from any IP-networked device.

Security

Typical use cases for intelligent, network-attached surveillance platforms require confidentiality and integrity of the transmitted content. This is especially important since the system relies on an open and public network infrastructure. Patton achieved security using encrypted VPN tunnels between the remotes and the headend (Command Center).

RSA-based public/private keys for encryption and X.509-based certificates provide authentication and authorization of all components of the system. VPN tunnels between the remotes and the commend center alleviatespotential problems arising from the dynamic nature of IP address assignment in cellular and other wireless data networks.

Analytics and Third-Party Integrations

The sheer number of video surveillance cameras and systems, the expense and ineffectiveness of human video monitoring and the need to correlate, aggregate and analyze related "non video" data is driving demand for analytics to be applied to surveillance systems. The acute demand for analysis of the video streams, both real-time and forensically, is driven by the need for action and reaction to events. Other use cases require integration of related solutions for safety, access control systems, alert systems, etc.

Analytics, event detection, discovery, propagation and response management vary dramatically market-by-market and customer-by-customer. Therefore systems must be "standards" based and appropriate open programming interfaces must be made available to third-party developers. Patton's developer program and related "eco-system" of integration partners enables us to meet the customer-specific and application-specific needs for analytics integration.

Forensic-Quality Storage and Retrieval

In addition to real-time wired and wireless transport of data and video, high resolution video images need to be retrieved for the purpose of analysis, archiving, mining, profiling, and legal prosecution. Patton's Visuality System, offers native forensic-quality storage of data and video as well as the ability to have network-attached storage.

Conclusion

New technology from Patton is enabling governments, industry and business to save lives, protect critical infrastructure and preserve value assets. Patton provides modern tools for deterring and fighting crime and terrorism to a wide range of customers.

Stream-and-Store

Visuality is "networked" for surveillance, collection and intelligence distribution.

Stream-and-Store Solution

The Patton Visuality™ Stream-and-Store systems offer a complete mobile video surveillance solution. Designed initially for mobile video recording, Visuality also permits recording and/or live real-time streaming of all video sources. The Patton Visuality solution allows the user to Know Now™ and offers the tools to act by delivering secure high-quality, real-time field information through audio, video, and geospatial inputs anywhere and anytime.

The Patton Visuality solution is the only choice which provides a single integrated, uniform, and scalable solution. These integration points, which are fully realized in the Visuality solution, are:

- Simultaneous high-quality recording and low-bit rate streaming
- Real-time GPS correlation of terrestrial/geographic location with video and audio

- Secure bi-directional data transport over any IP medium including eolution-data optimized (EV-DO) service
- Visualization, rendering, and re-distribution of acquired data at operations center
- End-to-end secure management including system, user credentials, and applications
- Integrated sensor data collection, analysis, and information distribution

Visuality is a complete remote surveillance solution with integrated video, audio, and sensor data acquisition. Visuality functions as an intelligent "networked" media server providing the simultaneous recording and streaming play out of up to four video sources with coordinated GPS location data. All data and information is provided over a secure end-to-end tunnel with user-defined encryption options. For end-to-end management and coordination, the Visuality Command Server offers a secure head-end operations command center permitting security, control, configuration, and location management for a fleet of field units.

Left side view camera

Rear view camera

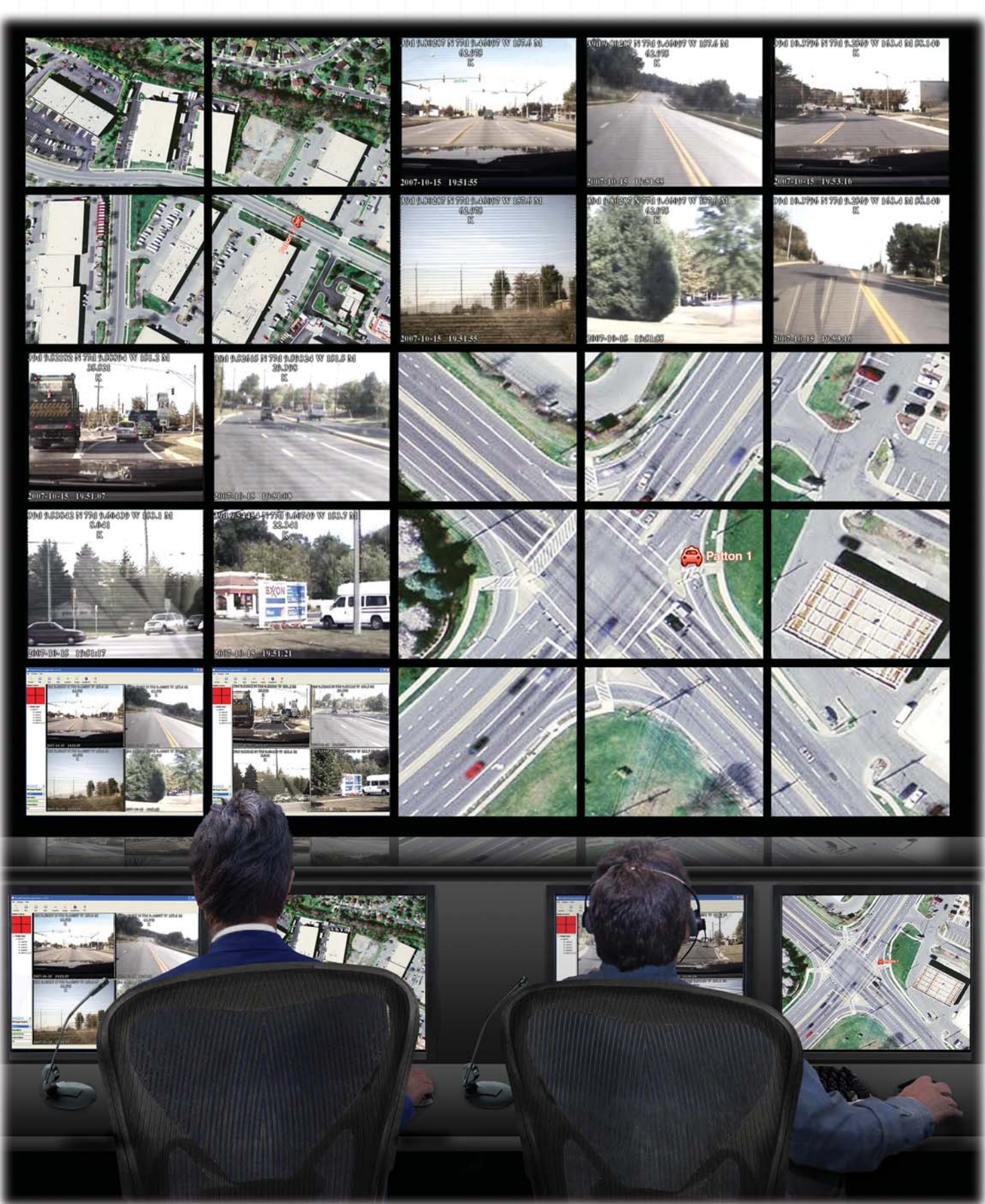Front view camera

GPS Satellite

Right side view camera

In-vehicle Display Console

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Visuality Command Shift™ Technology

Visuality™ Command and Control Servers provide an operator with total and secure control of all remote Visuality surveillance assets from a single point of management. Full tunnel termination provides access and remote control over the fielded systems.

Additionally, the Visuality Command Center solution enables *ad hoc* sharing of surveillance assets between command centers and also provides the ability for a Centralized Command Center to acquire any or all of the surveillance assets when required.

Command servers receive video and tracking data from the fielded systems. A primary command server can be located in a regional center. Any number of independent (secondary) command servers could be located at other departments and agencies at other locations, running different missions.

On a routine basis, mobile Visuality units would be assigned to the various secondary command servers.

During an emergency, an administrator could, with the ease of a "drop down" menu, move the mobile assets from any command center to any other command center. This would allow the mobile assets to report to and be commanded by the new secondary server.

Or, in the converse, mobile assets which routinely report to a secondary server could be moved to report to a consolidated command. In an ongoing emergency, mobile units could, upon start-up, receive notification from the master command that they are now reporting to a designated secondary server. Should the secondary be unavail-

able, the unit would report back to the master command and advise an alarm condition.

The ability of secondary command centers to receive data can be controlled by the master administrator or the consolidated command.

Consider the case of several neighboring municipalities, who use Visuality in various departments. Or where federal or state homeland security agencies may benefit from partnerships between agenies, or have the demand to centralize command. Each county or region, can maintain its own command center for their own daily missions. If and when an emergency occurs, which requires requiring the sharing of awareness or the consolidation of ccommand, Visuality can provide the movement of assets and control within the temporary command structure.

Master Command Server

In this scenario, under normal conditions, each entity maintains its own command servers for independent operations.

Local Police

State Police

**State Homeland Security**

State Bureau of Investigation

To deploy Command Shift™, a Visuality configuration must comprise one Patton T7900 "Headend" server in primary mode, multiple T7900 servers in secondary mode, and at least one T771X remote unit. The Visuality MSP is a highly versatile platform that can be configured to meet different operational requirements.

Typically, a T7900 operates in primary mode. All T771x remotes are configured with the public IP address of this primary. At run-time, all remotes establish a secure encrypted connection to the primary server to request registration. When access is granted, the remotes set up an encrypted tunnel with the primary that enables them to be configured and controlled from a management console. All surveillance data gathered by the remotes can be sent to the primary to be aggregated and distributed to end users connected to the primary.
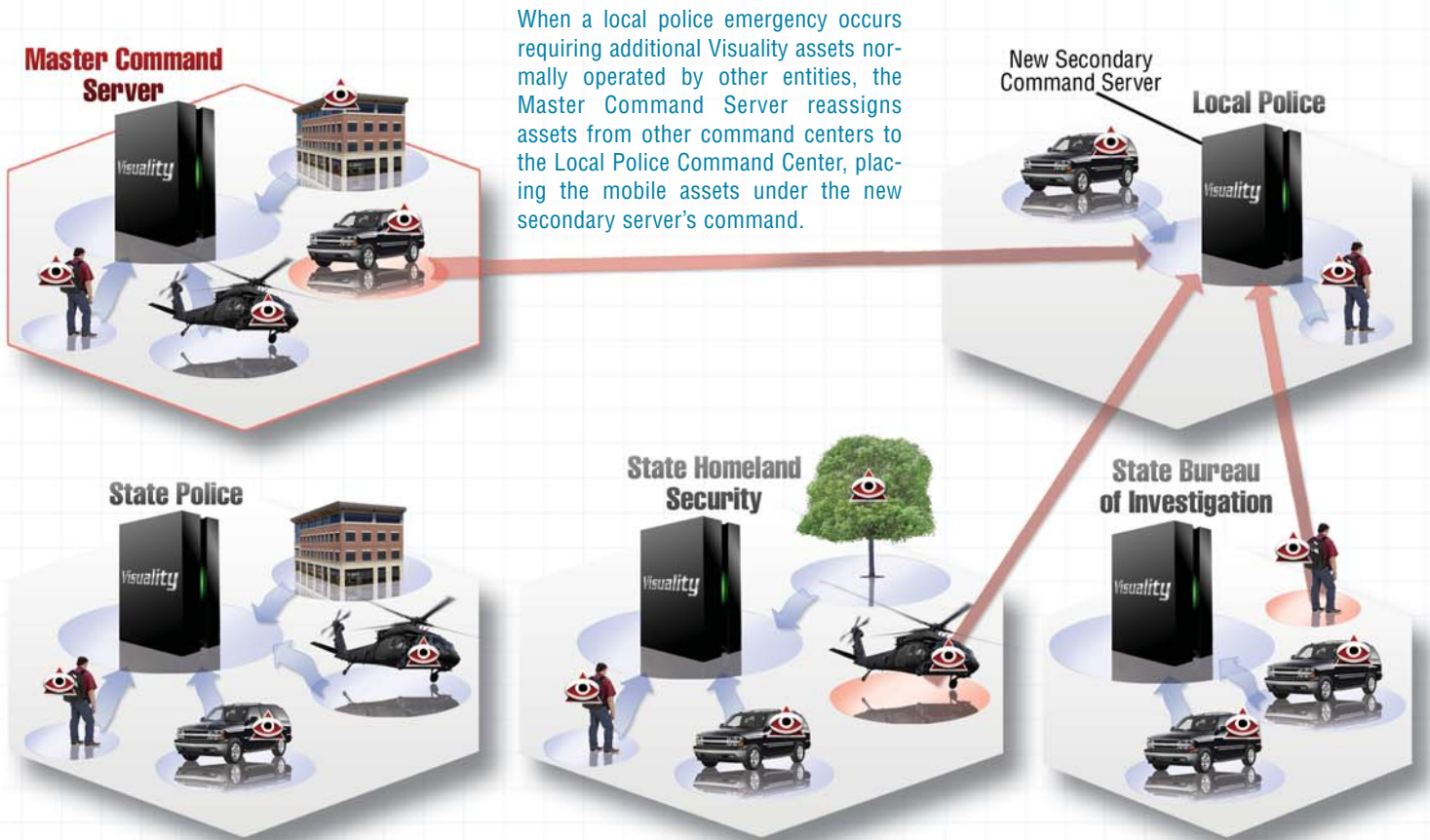
Additional T7900 servers can also be configured in secondary mode. Secondary servers,

like the remotes, are configured with the public IP address of the primary and register with it in a similar fashion at run-time. The primary can reassign registered remotes between secondary servers at any time. When redirected, the remote registers with and sets up a tunnel to the secondary. The remote is fully controllable from the secondary. All surveillance data the remote gathers can be sent to the secondary for aggregation and distribution to end users connected to the secondary.

Using T7900 servers in primary and secondary modes enables convenient management and sharing of remote assets between command and control centers without having to physically access the remotes.
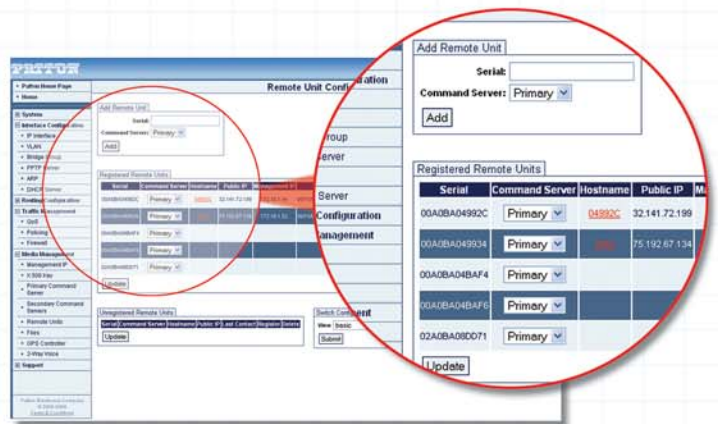
Users can monitor remotes in real-time from the Web Management Interface (WMI) page of the primary T7900 server. On this page, users can update the database of registered remotes to add or remove remotes, and assign remotes to primary or secondary servers. The WMI page also includes status of the registered remotes.

When a local police emergency occurs requiring additional Visuality assets normally operated by other entities, the Master Command Server reassigns assets from other command centers to the Local Police Command Center, placing the mobile assets under the new secondary server's command.
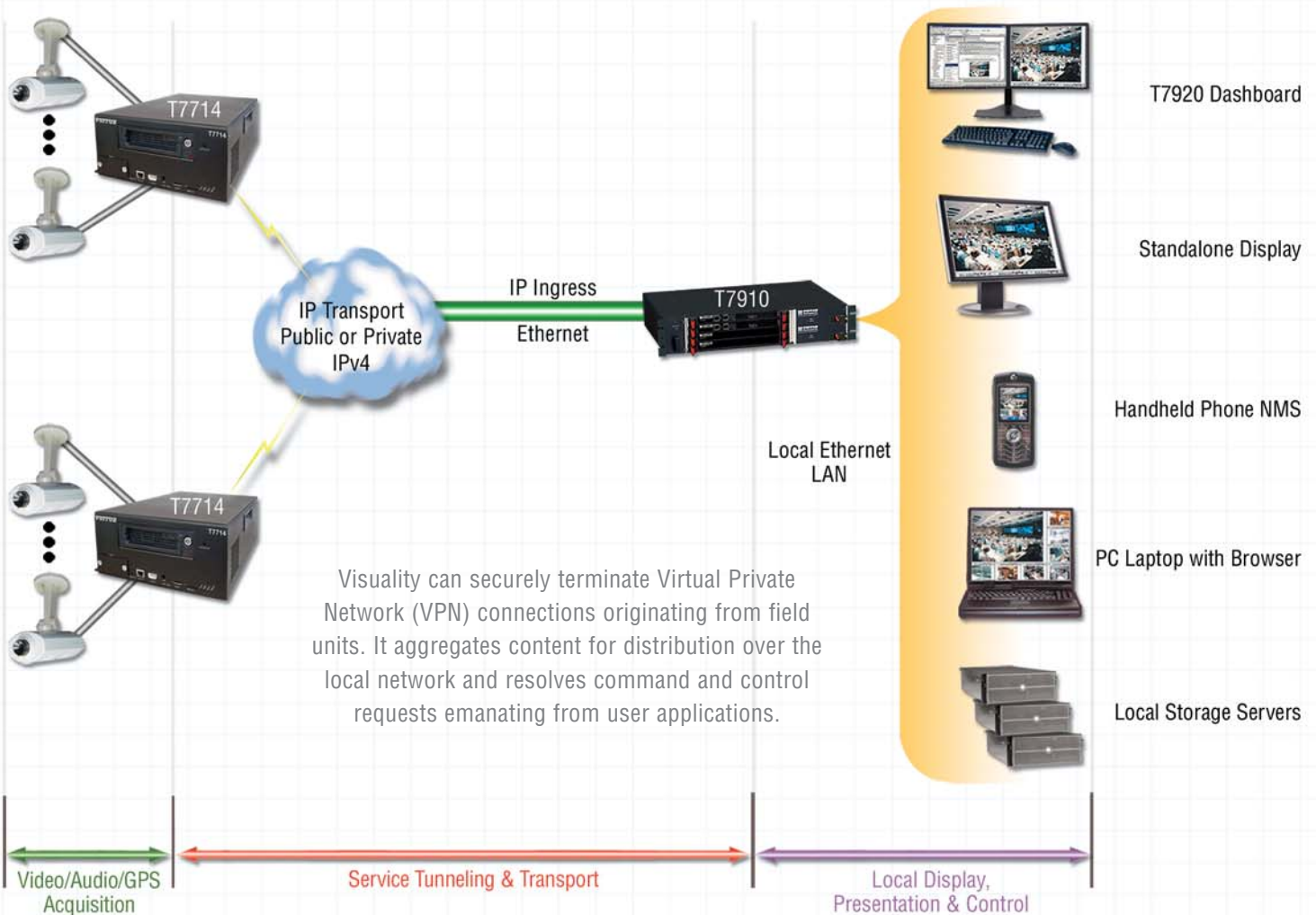
Benefits of the Visuality Solution

While Visuality can be used as a single digital video recorder, it can be configured for multiple simultaneous video, audio, sensor inputs and GPS with live over-the-air streaming. The stream-and-store configuration permits high quality recording while sending encrypted and protected live video over any existing IP/data network.

Visuality can securely terminate Virtual Private Network (VPN) connections originating from field units. It aggregates content for distribution over the local network and resolves command and control requests emanating from user applications.

With the Visuality™ Solution You Can…

- Capture and locally record standard definition video/audio/GPS from up to four sources

- Simultaneously send multi-input live and real-time audio, video, and GPS streams to one or more display consoles

- Remotely control of remote pan-tilt-zoom cameras

- Receive complete installation support, including installation with adjacent third-party solutions

- Redistribute and share incoming audio, video, and GPS data with other display/control devices

- Receive local Maryland based support with expanded hours of operation

- Track remote appliances to their exact geospatial location in real-time or shifted-time

- Deliver end-to-end security and addressability over any network uplink or infrastructure including cellular, the Internet, or private IP network

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Benefits of Visuality™

Standards-Based Architecture
Standard and scalable hardware with flexible software supports growth *and* service offerings.

Software Controlled
Provides local and remote command and control functions. Software-configurable options and service sets allow reception, storage, playback, and management of virtually any video format.

Stock Standard or Fully Custom
Available turnkey systems tailored and configured for specific operations.

Application-Based Remote Access
Provides on-demand access to live content and archived events from any networked PC or video play out terminal.

Network Integration
Integrates seamlessly and securely with any IP network and/or the Internet. Internal firewalled networks limit access to network file storage and account control.

User-Based Control
Allows multiple users to select multiple cameras, views or locations for recording, viewing or triggering. Simultaneous viewing with multi-picture display capability. Tune camera video streams to available bandwidth (frame rates, resolution, encoding).

Visuality™ Delivers...

Intelligence Gathering
- Remote, fixed, or mobile surveillance
- Manned or unmanned operation
- Local storage and remote wireless real-time video, audio and data transport
- Includes full remote camera control PTZ
- Integrates with automotive and attached sensors, detectors & tracking devices
- Supports industry-standard motion detection with the ability to integrate user defined trip wires for recording and video transmissions
- Extensible to application of third-party analytics for targeted intelligence (behavior analysis, target recognition, data recognition, face detections, event integration, etc.)

Forensics
- High resolution, forensic quality local video storage. Meets legal evidentiary standards. Suitable for production of training and education videos.
- Removable storage; downloadable via local Ethernet
- Perfect for analysis and useful for after-action and lessons learned

Awareness
- Provides real-time situational awareness to command center operations, rebroadcasted to any workstation or handheld device
- Enables remote personnel to gain true situation appreciation from multiple video "fields of view"
- Enables real-time monitoring and analysis of video and sensor data including GPS coordinates, vehicle speed, elevations…more
- Enables real-time threat detection, mitigation and responses. Pushes real-time views to fighters or first responders carrying any IP-enabled devices

Background

In early 2006, a US government agency engaged TSWG for the realization of a true, mobile-video surveillance system. TSWG engaged a known partner to configure a first-generation solution based on Intel PC hardware and off-the-shelf video processing cards and cell-modems. The system worked, but was not suitable for the agency's application. The customer required real-time video processing for real-time situational awareness.

TSWG and the related contractor needed a partner with the breadth of knowledge and experience in embedded software design, digital signal processing, encryption, and IP networking to provide the first fully integrated, portable, real-time, mobile video surveillance system.

Performing under contract, Patton brought its design and manufacturing capabilities to bear, ultimately delivering the system that TSWG required. Today, that system is commercially available as Patton's Visuality™ Mobile Video Systems.

Building the Counter Terrorism Modular Surveillance Toolkit

To protect VIPs travelling beyond reach of high security systems installed at fixed locations, security teams require specific surveillance capabilities. A team's rate of success in mitigating attacks can be greatly increased by providing the surveillance tools necessary to discover human operatives across long distances.

Patton developed a small, adaptable modular surveillance toolkit that supports man-portable, vehicular and rooftop surveillance. The toolkit offers video and audio capture, local storage, and encrypted uplink to a remote command center via the cellular network. The modular surveillance toolkit is equipped with two pan/tilt/zoom controlled cameras and a secure digital high capacity card for data storage. The toolkit for vehicle surveillance has four cameras with pan/tilt/zoom control, covering all sides of the vehicle for greater situational awareness. It also includes a removable hard disk drive for data storage. The system also provides GPS data so the vehicle can be tracked in real-time with the video stream.

Patton's Visuality Solution Addresses Many CTTSO and TSWG Missions

- **Physical Security (PS)**…satisfy inter-agency requirements for physical security technology to protect personnel, vital equipment, and facilities against terrorist attacks.

- **VIP Protection (VIP)**…satisfy inter-agency requirements for equipment and systems that provide alerts and prevent attacks on VIP protectees. This includes hardware and tools that provide security to both the VIPs and their protectors. Inherent in this development is additional emphasis on life safety and emergency response equipment.

- **Surveillance, Collection, and Operations Support (SCOS)**…satisfy inter-agency requirements supporting intelligence gathering and special operations directed against terrorist activities.

- **Tactical Operations Support (TOS)**…enhance the capabilities of DoD and inter-agency special operations tactical teams engaged in finding, fixing and finishing terrorists. This includes the development of capabilities for state and local law enforcement agencies to combat domestic terrorism.

- **Investigative Support & Forensics (ISF)**…satisfy inter-agency requirements for criminal investigation, law enforcement, and forensic technology applications in terrorism related cases.

- **Training Technology Development (TTD)**…satisfy inter-agency requirements for the development and delivery of products and technologiees that support education, training, and mission performance relative to combating terrorism.

About TSWG and CTTSO

The Combating Terrorism Technical Support Office (CTTSO) and the Technical Support Working Grop (TSWG) are standalone inter-service, inter-agency and international working groups that conduct R&D programs for combating terrorism. TSWG is a user-driven organization tasked with rapidly developing the newest technologies for war fighters and first-responders to combat terrorist activities. TSWG operates across the four pillars of combating terrorism: antiterrorism, counterterrorism, intelligence and consequence management.

Structure & Memberships (Customers)

CTTSO and TSWG are overseen by US Department of State (DOS), operated as a "program office" under the Assistant Secretary of Defense (ASD). The office includes "Technical Chairs" from the Department of Defense (DOD), Department of Energy (DOE) and the Federal Bureau of Investigation (FBI).

The organization leverages technical expertise, operational objectives, and interagency funding. This collective approach to resource and information sharing positions the CTTSO to gather front-line requirements that serve multiple users.

TSWG members include hundreds of US Agencies and many foreign governmental bodies (see www.cttso.gov/membership.html).
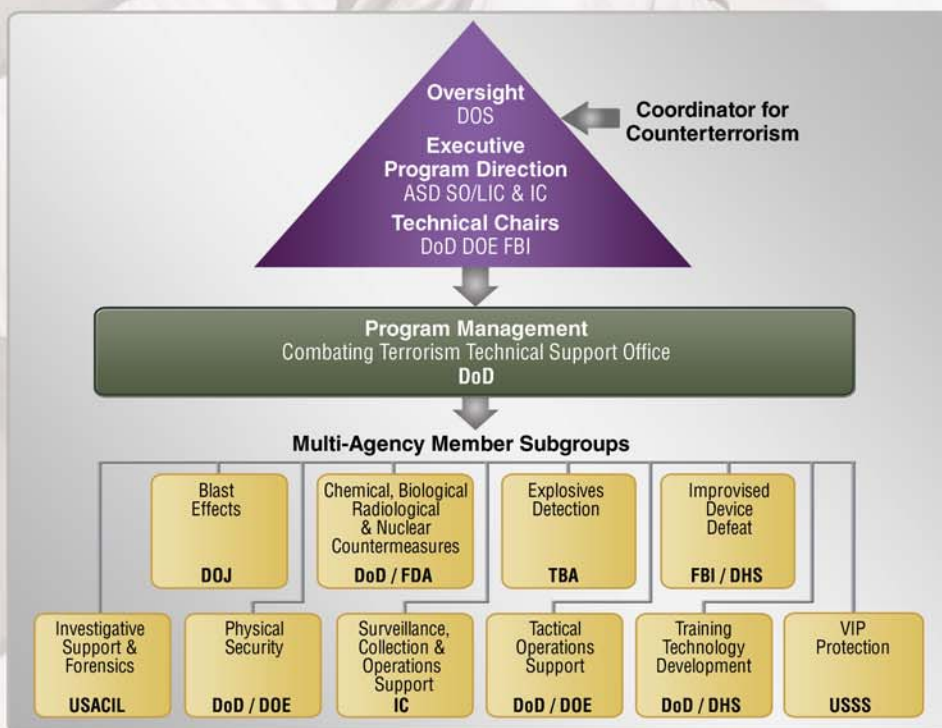
Timeline

1982

National Security Decision Directive 30 formed the Inter Departmental Group on Terrorism (IG/T), later known as the Inter Agency Working Group on Counterterrorism (IWG/CT).

Chaired by the Department of State, this inter-agency group was given responsibility for the development of US policy on terrorism.

1983

In the aftermath of the Beirut bombing, the Technical Support Working Group (TSWG) is formed as a sub-group of the IWG/CT with the primary consideration of providing security for military and government personnel in federal facilities.

1986

A cabinet-level Task Force on Counterterrorism cites TSWG as "assuring the development of appropriate counterterrorism technological efforts."

1993

US Congress recognized the international nature of the terrorist threat and authorized TSWG to expand into an international organization.

1999

CTTSO was assigned program management functions for the TSWG.

Oversight
DOS

Executive
Program Direction
ASD SO/LIC & IC

Technical Chairs
DoD DOE FBI

Coordinator for Counterterrorism

Program Management
Combating Terrorism Technical Support Office
DoD

Multi-Agency Member Subgroups

Blast Effects	Chemical, Biological Radiological & Nuclear Countermeasures	Explosives Detection	Improvised Device Defeat
DOJ	DoD / FDA	TBA	FBI / DHS

Investigative Support & Forensics	Physical Security	Surveillance, Collection & Operations Support	Tactical Operations Support	Training Technology Development	VIP Protection
USACIL	DoD / DOE	IC	DoD / DOE	DoD / DHS	USSS

Awareness is Everything

Introduction

Visuality is an awareness-delivery-and-distribution-platform designed for team-based operations. It brings our customers real-time as well as forensically collected video, audio and sensor data. It enables real-time remote surveillance in manned or unmanned command-and-control operations. Scalable deployed systems along with networked command centers offer awareness to a hierarchy of users, enabling awareness to be provided to the right users at the right time. Within the context of both fixed and highly mobile environments, Visuality is a unique tool using surveillance for the provision of awareness in the classic sense of the term.

Surveillance

Surveillance is a word which comes from the French word for "watching over" and it most often applied to observation from a distance by means of electronic equipment or interception of electronically transmitted information.

Visuality™ and Situational Awareness

The commonly accepted definition of *situational awareness* is "The perception of elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future" Endsley (1995b)

Awareness is a vital foundation for successful decision-making and action, but is often elusive in team-based environments; especially when decision makers are geographically dispersed. Insufficient situational awareness has been identified as one of the primary factors attributed to human error. Awareness is important in any endeavor where information flow is high and/or where poor decisions can lead to grave consequences.

Having accurate and timely awareness is essential:

- Where technological and situational complexity effects the human decision-maker

- Where action and reaction are required to mitigate or prevent negative consequence and cost (i.e. preservation of life and protection critical assets)

- Where it's necessary for actors to "observe from a distance" to enhance agility and effectiveness of actions

While plenty of alternative definitions for situational awareness exist, nearly all restate the same cognitive themes of perception, meaningful comprehension and anticipation for the purpose of decision action and response.

The process of achieving and maintaining awareness can be summarized as a cognitive comprehension "loop."

It is important to distinguish the term *situational awareness*, as a state of knowledge, from the processes used to achieve that state. This process, which may vary widely among individuals and contexts, refers "assessment" as the process of achieving, acquiring, or maintaining situational awareness. Situation awareness is therefore understood as "a state of knowledge," and situation assessment as "the processes" used to achieve that knowledge. Note that *awareness* is not only produced by the processes of situation assessment, it also drives those same processes in a recurrent fashion (see figure 1).

From the individual user's viewpoint, Visuality™ is capable of providing inputs to the user required to make decisions. Inputs can be "pushed" from the command centers, or "pulled" by the user subscribing to different streams of data.

Figure 1. Adaptation of Endsley's model of situation awareness (Endsley, 1995b)
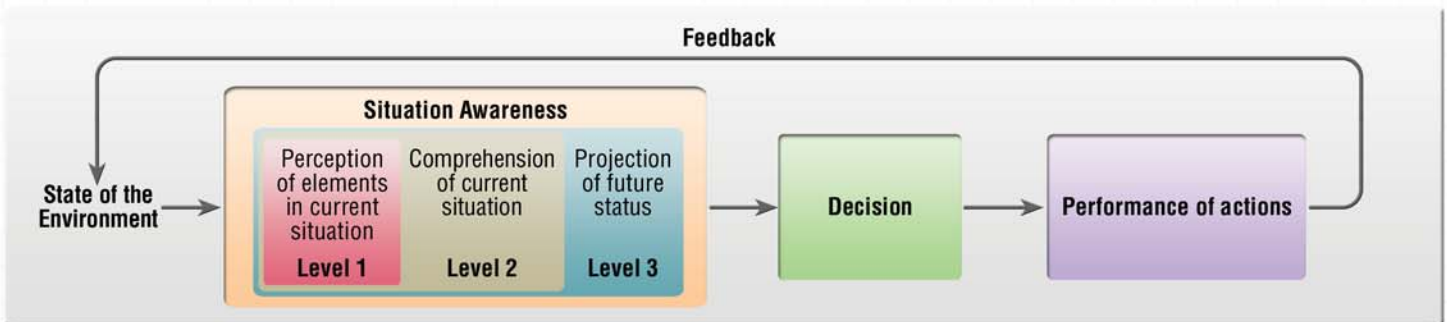
Visuality™ and Team-based Awareness

In most organizations people work as members of a team. A team is not just any group of individuals, instead they are together for a purpose. *Team* can be defined as "a distinguishable set of two or more people who interact dynamically, interdependently and adaptively toward a common and valued goal/objective/mission, who have each been assigned specific roles or functions to perform, and who have a limited life span of membership." Salas et al. (1992). *Team awareness* is "the degree to which every team member possesses the situational awareness required to perform his or her responsibilities" Endsley, 1995b.

The success or failure of a team depends on the success or failure of each of its team members. It only requires one team member with inadequate awareness for a critical error in performance to occur. Every member of a team should have the maximum awareness required for the performance of their duties.
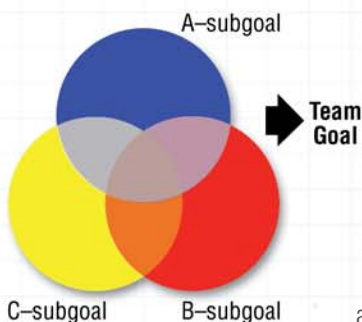
However, they require more than just that specific intelligence related to the job. The team must also possess shared awareness, where team members possess the same awareness on shared requirements.

Therefore, good team-based situation awareness requires a high level of awareness among individual team members for the aspects of the situation necessary for their job, and a high level of shared awareness between team members, providing an accurate common operating picture of those aspects of the situation common to the needs of each member (Endsley & Jones, 2001).

To provide team-based awareness, Visuality™ works to deliver shared and shareable information in the typical forms of direct verbal communication, shared audio, video, location, sensor data, etc.

Visuality™ and Command-and-Control

Command and control is a term which has its origins in military circles It can be defined as the exercise of authority and direction by a commanding officer over assigned or attached forces in the accomplishment of the mission. While information flow toward the commander is a priority, command and control activities are designed to empower and multiply the effectiveness of teams. Current thinking about command and control is within the 21st century view of *network centric warfare* (NSW). In simple terms, NCW is a two-step process: First achieved shared awareness and second, leveraging shared awareness to achieve a greater degree of "self-synchronization", leading to dramatic increases in agility and effectiveness of the force.

Within the context of building awareness to teams operating with the Command and Control structure, the volume of available data inherent in complex operational environments can overwhelm the capability of novice decision makers to attend, process, and integrate this information efficiently. This can result in information overload and negatively impact their awareness. In contrast, experienced decision makers assess and interpret the current situation and select an appropriate action based on conceptual patterns stored in their long-term memory as "mental models" (Serfaty, MacMillan, Entin, & Entin, 1997). Cues in the environment activate these mental models, which in turn guide decision making process.

Furthermore, challenges exist in team-based models to deliver the right information by the right users at the right time:

- There are many types of data that serve different purposes

- There are different team members

- The team members are operating in different roles as users of the data

- Information relevant to certain participants in any given mission needs to be distributed or subscribed in accordance with the mission.

Therefore, the distributed and networked command and control that Visuality provides is required because:

- Experienced decision makers, operating within the command structure but, outside of the immediate area or even outside of the theater of operation, offer in some cases superior cognition in the process of situational awareness.

- Not every bit of available information is important to every recipient. Since bandwidth is a precious commodity in any operational environment, "filtered," "digested" information passed to individual users can enhance the overall situational awareness value to the field agent or war fighter.

Conclusion

Visuality provides the means for decision makers to know what is happening in and around fixed or mobile environments; provides understanding how information, events and user actions could impact team-based goals and objective. As a tool for enhancing awareness, Visuality delivers a comprehensive shared awareness furthering the agility of forces and responders through Command and Control structures in the spirit of Network Centric Warfare.

There is no better commercial off-the-shelf solution on the market for the provision of real-time situational awareness and after action forensic analysis, within the context of mobile team based operations.

Note: A version of this document with footnotes is available upon request.

Physical Security/Asset Protection

Remote Security Application for the Trucking Industry

A precious metal mining operation in South Africa needs to get its refined product to market. They rely upon the expertise of a transport company to move the goods. Specialized trucks transport payloads from their distribution center to the secured shipyard freight terminal at the Port of Durban. As the trucks themselves are valued at over a million dollars and each payload can be worth up to 10 million dollars, the route (and each re-fueling stop) is planned carefully.

Visuality is there to provide total security; protecting personnel, equipment, and cargos.
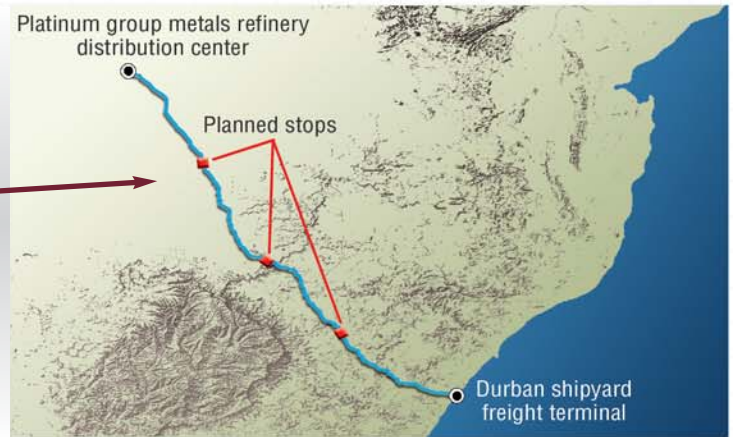
The Visuality system provides remote real-time video, GPS vehicle positioning, and audio communications to the transport company's command and dispatch center. Additionally, vehicle telemetry can be fed to the Visuality system and sent over the 3G link. This telemetry information, when integrated into the Visuality dashboard system, can display abnormal telemetry readings immediately. A "panic button" to send an emergency signal to the command center is included in the driver's compartment and triggers an immediate alarm indicating a dangerous situation. All streaming video, audio, and sensor data can be recorded in high resolution inside the vehicle as well as viewed and recorded at the command center in real time.

The current scenario involves vehicles configured with 3 cameras each—two with PTZ and the third is fixed in the driver's compartment. In addition to these mobile cameras, the transporter will have stationary cameras installed in their fueling facility, loading terminal, and receiving terminal for verification of loading/off-loading.

Precious Metal Transport

• Video verification of loading and unloading
• Video monitoring of transport route
• Alarm notification upon detection of deviations from planned route
• Payload integrity assurance during all phases of transport

Driver Safety	✓ Ensure proper vehicle operation ✓ Prevent unauthorized or dangerous stops ✓ Prevent unauthorized access to vehicles or cargos ✓ Video and audio monitoring off all events ✓ Panic button for immediate notification of dangerous situation	**Payload Protection**	✓ Monitor and protect access to the payloads ✓ Monitor payload movements ✓ Video confirmation of proper cargo loading to the truck ✓ Video confirmation of complete and accurate off-loading of the payload ✓ Theft detection and prosecution of any loss
Driver Performance	✓ Detect route deviations ✓ Prevent abusive vehicle operation ✓ Ensure proper refueling ✓ Prevent unauthorized use of the vehicles ✓ In case of accidents, video confirmation of the accident report	**Equipment Operation**	✓ Detect any abusive operation of the vehicle (Hard or excessive braking or acceleration, Excessive speeds, over-throttling the engine) ✓ Monitor road conditions ✓ Monitor equipment performance

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PTZ Payload Camera
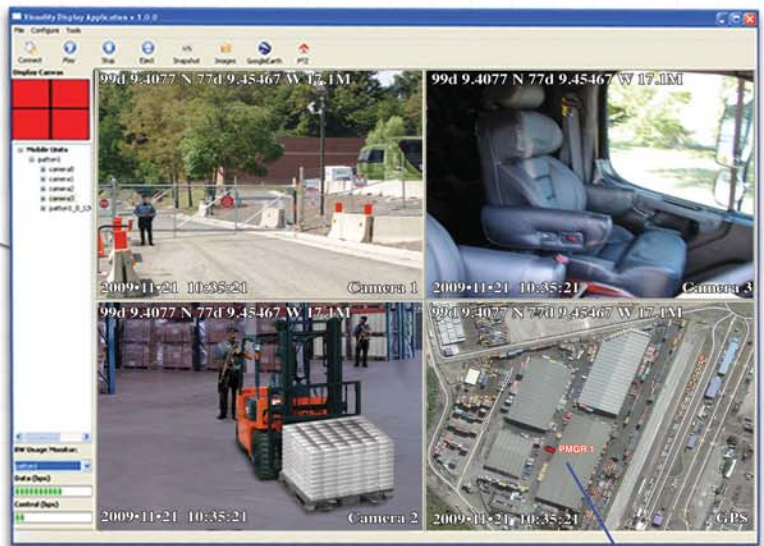(enclosed in weather-proof dome)

Window-Mounted
In-Cab Video Camera

Secured Shipyard Freight Terminal

Command & Dispatch Center

Visuality window displaying payload camera
views, in-cab camera view, & GPS satellite location

Summary

With requirements for both personnel safety and payload protection, only a multi-functional system like Visuality can provide the type of security required and demanded by the truck transport industry.

Google™ Maps Satellite view

Campus-Based Temporary Shared

A small university on the east coast of the United States is hosting an important symposium on campus. A delegation of mid-level Israeli government officials will be taking part in the event. Concerned about potential attacks, they have requested stepped-up security. The Israeli delegation will only be on campus for one day until 10 pm that evening.

The state's bureau of investigation leads a statewide partnership of local and federal officials to fight terrorism and crime. They evaluated the security situation on campus at the request of federal officials and decided supplemental efforts were required to ensure protection of the delegation.

Prior to the event, the state bureau of investigation arrive with bomb-sniffing dogs and sweep the building and surrounding area where the meetings will take place.

During the event, the campus police department is responsible for providing two uniformed officers at each entrance to the building. The state bureau of investigation will provide one roaming plain clothes officers in and around the building where the Israeli0s are meeting. Those officers are all committed to the one building until the delegation leaves later in the evening.

Working in cooperation with the campus police department, the state bureau bring one Visuality T7712 backpack unit, worn by the plainclothes agent. Two T7714M portable two-camera systems are placed at temporary monitoring locations, strategically placed for careful surveillance of the building's ingress and egress points, including a view of the second floor where the meetings will take place.

The state bureau sets up a T7911 Portable Command Center in the campus security center. The entire five-camera operation is monitored by trained personnel and communications are established with all local responders. The uniformed presence is maintained at the building for visibility and immediate response to any incidents that occur at the conference. All other campus and local police maintain routine patrols and respond to regular calls while remaining on alert in the event of any incident related to the visiting delegation. The entire campus enjoys a safe and productive evening.

Partnership in Action

Campus Police	State Bureau of Investigation
Responsible for campus security	Protection detail is assigned to visiting officials
Uniformed officers assigned to entry ways	Conducts pre-meeting bomb detection sweep
Uniformed officers continue normal routine patrols	Plainclothes agent patrols area with a backpack unit providing mobile awareness to the command center. Agent carries a hand-held phone and monitors views of the area.
Campus security hosts the state bureau in their monitoring center	Temporary surveillance and temporary command center operations are set up alongside campus security

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Security

Camera
Lines-of-sight

Portable Covert
Video System

Agent

Side entrance guarded
by uniformed officers

Second floor location
of symposium

CAMPUS FIXED SECURITY MONITORING CENTER

PORTABLE MISSION COMMAND CENTER

Patton's T7900 Portable
Command Center
supports short-term missions

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PE PATTON Electronics Co.

A large private investigation firm is retained by large insurance providers to investigate possible insurance fraud cases before claims are paid. A local investigator is assigned to a target with the hopes of catching the target engaging in some movement or action that the target claims is impaired or lost.

The PI firms sets up their surveillance on the target.

Without Visuality™

The PI follows the surveillance subject from his home and into a restaurant for ongoing observation. To maintain surveillance of the target when he leaves the restaurant, the investigator has to run to his vehicle to grab his camcorder and begin recording the target. His mad dash to his own vehicle draws attention to himself. Only recorded proof will be accepted as evidence. As the investigator follows the target in his vehicle, the investigator often has to drive and operate the camcorder simultaneously, which includes framing the shot in the view screen; this while keeping one hand on the wheel, and the other holding the camera.

With Visuality™

The surveillance subject is being filmed in the restaurant from the micro camera hidden in the private investigator's backpack strap. He records the subject eating with the arm that is in a cast, and that he has removed his neck brace.

Following a hunch that the subject is becoming careless, as the target exits the restaurant, the private investigator follows, pushing a button on his Visuality remote control that starts all four cameras recording in his Visuality-equipped vehicle parked outside. The system runs off the car's battery even before the investigator gets to the car and starts it.

Once moving, the vehicle's cameras continue to operate. A dash-mounted pan-tilt-zoom (PTZ) camera enables the investigator to re-position the camera by glancing at his dash viewer and nudging the camera's control stick. The subject is completely unaware that he is being followed or that his moves are being documented as he enters a nearby liquor store.

Simultaneously, at the PI headquarters, streaming video of the operation arrives at the Visuality Command Center. A mission operator takes snapshots at various points to include in the weekly update that the insurance company has requested. Each frame is stamped with the date, time, and GPS coordinates of the shot.

The IP-based Visuality system enables a client to also observe the video stream in real-time, which—acting on the PI's hunch—the insurance company proceeds to do.

Mobile Surveillance

The PI exits the vehicle to follow the subject into the store. Video from the micro camera hidden in the private investigator's backpack strap catches the subject walking without impairment on his injured leg, having shifted the crutch to the other armpit and now using the putatively injured arm.

The same camera observes the private investigator as he exits the store and resumes tailing the subject

A camera in the PI's vehicle records the subject exiting from the store carrying a large carton of beer. He is walking without the aid of his crutch and is using the cast-wrapped arm to hold the heavy carton.

This video (from the micro camera in the PI's backpack), showing the subject carrying the crutch on his shoulder while his neck brace dangles from a hip pocket, ends the surveillance. He does not appear to be in pain or impaired at all from injuries. The Visuality system has quickly enabled the client to gather conclusive proof of fraud.

VIP Protection/Diplomatic Security

Tension is running high in the country of Salouf on the Arabian Peninsula. Unverified reports that certain Saloufian government officials aided extremists in an attempted terrorist attack in Rome has placed this oil-rich nation on the brink of civil war as tensions mount between religious groups.

The Prime Minister of Salouf has successfully concluded talks with the country's leading cleric in an attempt to diffuse the tensions. He is scheduled to address the United Nations General Assembly in New York City in efforts to gather international support for his fragile government, bring the offenders to justice, and to keep the peace. There are already protesters gathering in the streets of Manhattan.

The U.S. State Department's Bureau of Diplomatic Security is charted to provide a safe and secure environment for the conduct of U.S. foreign policy. Part of that mission is the protection of high-ranking foreign dignitaries and officials visiting the USA, including visits to the UN Headquarters.

The story is fictional, but the application is real. A motorcade of dark Suburban's travels from the airport to the streets of New York carrying its dignitary to UN Headquarters.

Agents are on task, using Visuality to ensure everything and everyone is safe. Agents in nearby command centers are monitoring secure, live video streams on both stationary and mobile devices to remotely monitor the progress of the motorcade. Other agents posted at various locations can see the progress of the motorcade on hand-held devices, while remaining in communications with the Command Center. Agents in the Dignitary Protection Operations Center (DPOC) in a different city are also provided the same levels of awareness.

Visuality provided secure live video streaming from cameras in moving vehicles, integrated with camera views from various fixed locations. In addition, Visuality recorded all the video for future examination for investigative, tracking and data collection purposes. This level of situational awareness provided by Visuality enabled security personnel to achieve a level of awareness not possible in years past. Visuality enabled unprecedented security for a dignitary in a moving vehicle in a difficult urban environment.

Surveillance data is collected from Visuality systems located onboard vehicles and carried by undercover agents

Field agents can subscribe to any fixed or mobile stream to enhance awareness

Map Legend:

- ⭐ Waldorf Astoria & Towers
- ⭐ UN Headquarters
- ⭐ Command Center
- 🟨 Mobile Command Center
- 🟧 Covert Surveillance Vehicle
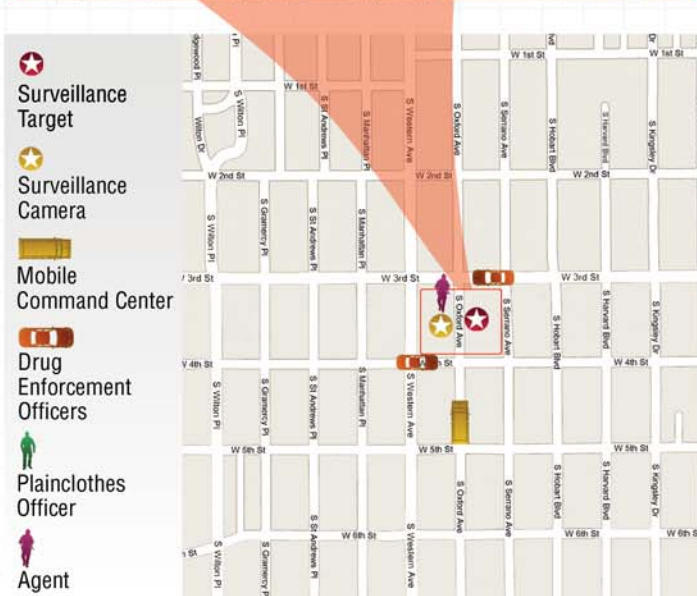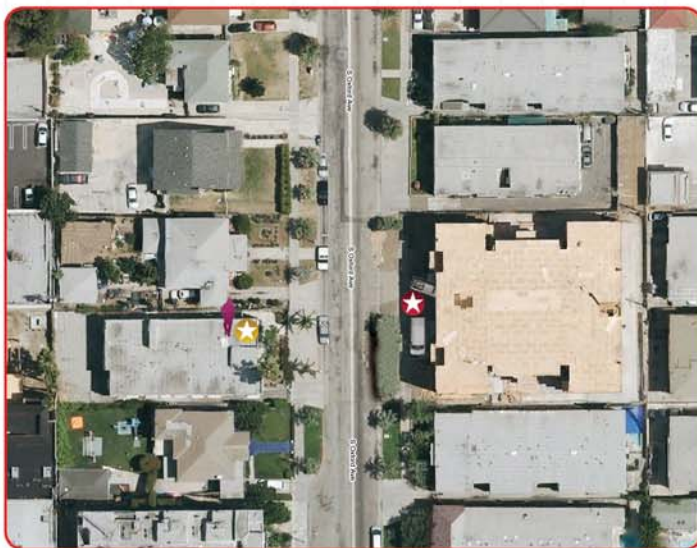- 🧍 Plainclothes Agent
- 🧍 Agent
- 🧍 Sniper

Covert Surveillance: Evidentiary

A Special Assignment Team (SAT) of a local west-coast police department has been working with an informant for the last four years. They now have a good bead on the activies of what could be the city's largest drug dealer. They receive word of a large drug transaction that is to take place. According to the report, the goods will be transferred from a white moving van to a pickup truck. Due to the perpetrator's security concerns, it is understood that the precise location of the transaction will not be known until a few hours before the deal. The proposed meeting zone is located in an area which might not be easily observed from the street level. The SAT team wants to video record the transaction as well as supply real-time video to the SAT commander who desires to monitor the transaction as well as the surrounding area. There are concerns that other "players" might be on the scene. The video camera needs to be easily set up, on short notice, on a rooftop, have internal or external battery poower, and be able to be controlled from the SAT commander's location. With pan, tilt, and zoom (PTZ) controls, police hope to develop the needed video evidence to avoid a long, drawn-out trial.

The portable version of Patton's Visuality™ Model T7712 is brought to bear in this temporary rooftop surveillance activity. Where the need is temporary and the mission is covert, portable power must be used or if a quick install is neccessary.

Surveillance Target

Surveillance Camera

Mobile Command Center

Drug Enforcement Officers

Plainclothes Officer

Agent

Critical SAT Members

The Installing Agent	Discreetly installs the device within a matter of moments, dressed as a building maintenance contractor	
	Pays due regard to covert placement and environmental concerns for the T7712 and camera	
	Is informed of mission needs in terms of battery use, power consumption, and desired camera targets/angles	
	Needs to frame the shot via command center assist or handheld/laptop unit	
	Is informed of and responsible for the retrieval protocol for this mission	
Command Center Operator	Utilizes PTZ pre-set points for regular scanning of the target area	
	Monitors the unit(s) for target activity	
	Pushes video to an off-site Mission Lead	
	Takes snapshots of activities as they develop	
	Retrieves the system, including high resolution video capture by the units	
Mission Lead/ Analyst	Monitors video streams as recommended by the Command Center Operator	
	Makes determinations if the response team will move in to make any arrests	
	Provides full awareness to the responding agents	

Drug Interdiction

SET-UP

MONITOR & CONTROL

COMMAND CENTER

OBSERVATION

AUTO AIR SERVICE

REACTION

POLICE

POLICE

BUSTED!

AUTO AIR SERV

POLICE

Mobile Video System
Visuality™ T7714 Multichannel Streaming DVR

The Patton® Visuality™ Model T7714 Multichannel Store and Stream DVR provides a complete and secure video, audio, and GPS surveillance solution with integrated capture, DVR storage, and streaming.

The Patton® Visuality™ Model T7714 Series Secure Store-and-Stream Media Appliances offer a complete mobile and fixed remote surveillance solution. The Model T7714 Series is specifically designed for applications requiring local capture, storage, and simultaneous streaming of all video sources.

Ideal for public safety, transportation, industrial and government monitoring and surveillance requirements, the T7714 supports full-resolution quality on all inputs. Along with local audio input and user I/O, the T7714 provides GPS location information with real-time and synchronized geospatial capabilities.

Wired or wireless uplink options permit easy streaming of all channels over virtually any cellular provider network while permitting over-the-air recall of any DVR recording. Now mobile systems can deliver live motion video in real-time for the ultimate in remote command and control.

Incorporating Patton's TrinityAE™ software service set, the Visuality™ solution provides standards based IP multi-service transport and interfacing with coordinated remote communications. The T7714 also adds system-wide network security and encryption options with secure end-to-end communications and multi-unit management.

When used with the Visuality™ T7910 Secure Command and Control Server an operator can ensure total and secure control of all remote units from a single point of management. Providing tunnel termination, user credentials, and complete remote unit control, the T7910 manages the simultaneous recording and re-streaming playout of up to 24 unique sources.
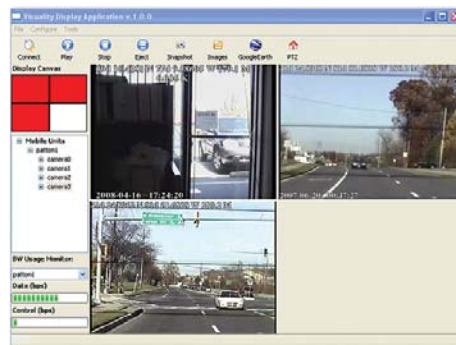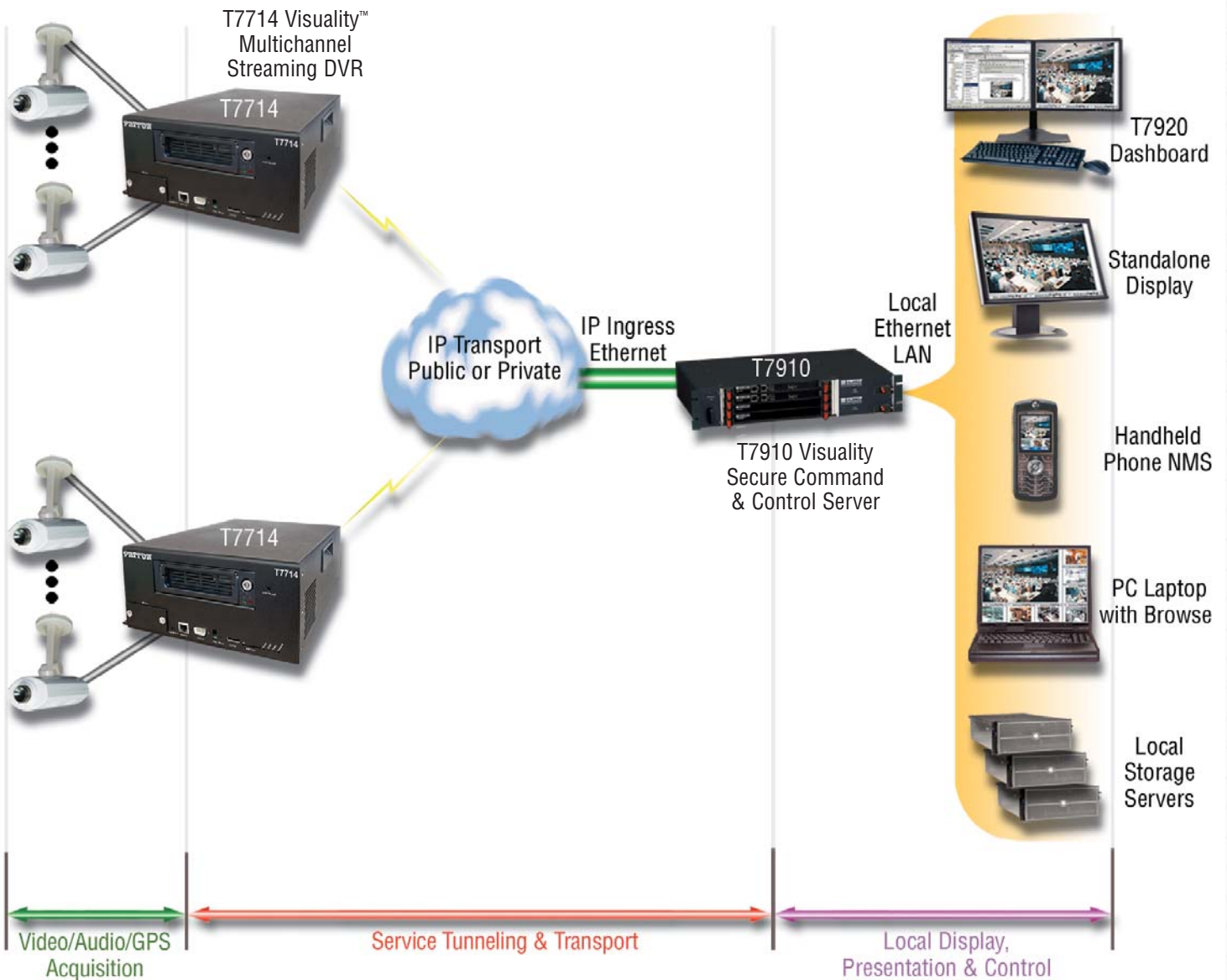

Mobile Video Server Management console powered by TrinityAE™.

For the most demanding surveillance applications, Patton's Visuality T7714 provides the only scalable, integrated solution video that provides streaming, storage, and playout for mobile or fixed applications.

FEATURES & BENEFITS

✓ **Full Definition (704x480) and Full Frame Rate (30 fps) on All Inputs**—Records video at D1 (704x480) size, 30 frames-per-second (fps) while simultaneously streaming at SIF (352x240) size, 15 fps. When recording is disabled, video content can be streamed at a max resolution of D1 (704x480) size, 25 fps.

✓ **Flexible Video Recoding Rates**—H.264 encoder supports D1, VGA, SIF, QVGA, QSIF, & QQVGA video resolutions at 5~30 fps.

✓ **Real-Time Location & Tracking with Integrated GPS**—Acquires, records, and transports NMEA 0183 GPS location sentences both locally and via streaming. All video is time-correlated and aligned to GPS time.

✓ **Vehicular, Mobile or Fixed Operation**—Use in mobile applications and stream content in real-time, or configure for fixed surveillance and monitoring applications.

✓ **Standard Protocols**—Supports a range of cellular technologies: 1xRTT, EV-DO Rev. 0 and Rev. A, HSPA using internal Airlink cellular modems.

✓ **Field-Swappable Hard Drive Media**—Locked drive bay for locally stored high-resolution video can easily be removed and viewed, copied, or archived.

✓ **Integrates with Patton's Visuality™ T7900 Series Head-End Content, Control and Management System**—Secure data tunnel termination from remote DVRs, content file indexing & local archiving, stream playout and re-streaming/broadcasting.

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T7714 Visuality™
Multichannel
Streaming DVR

T7920
Dashboard

Standalone
Display

Handheld
Phone NMS

PC Laptop
with Browse

Local
Storage
Servers

IP Ingress
Ethernet

Local
Ethernet
LAN

IP Transport
Public or Private

T7910

T7910 Visuality
Secure Command
& Control Server

Video/Audio/GPS
Acquisition

Service Tunneling & Transport

Local Display,
Presentation & Control

The Visuality T7714 Series functions as an intelligent networked media aggregator and provides the simultaneous recording and streaming playout of up to four video sources with full resolution on all channels. Including coordinated GPS location data, all data and information is provided over a secure end-to-end tunnel with user defined encryption options.

Uplink options include integrated cellular wireless support for 1xRTT, EV-DO Rev. 0 and Rev. A, and HSPA using internal Airlink cellular modems. Or use the Integrated Ethernet port for connection and transport over any public or private IP network or even the Internet.

For end-to-end management and control the Visuality Model T7910 offers a secure headend command server permitting security, control, configuration, and location management for up to 24 remote T7714 streams.

Product Highlights

Front view

Made in USA

T7714

HDD Shutoff

Uplink options for any
wireless streaming uplink

Field-removable & lock-
able hard drive storage

Front status
indicators

The Visuality T7714 Series is a complete mobile and fixed surveil-
lance solution for streaming and recording audio, video, and geolo-
cation data. The T7714 offers a compact and durable enclosure with
field removable and lockable media, local network access, and mod-
ular streaming wireless uplink options

Rear view

T7714

With its versatile dock station and port replicator, the T7714
DOCKMATE offers the convenient ability to pre-wire vehicles and
quickly rotate multiple T7714 Streaming DVRs on-demand.
Offering the same interfaces as a fixed-installed T7714, the
DOCKMATE provides a stable locking base while retaining all the
functions of the T7714. With the DOCKMATE, every vehicle can
be streaming ready and put into service at a moment's notice.

DOCKMATE Station

CAN bus & PTZ   Power, I/O & network connections
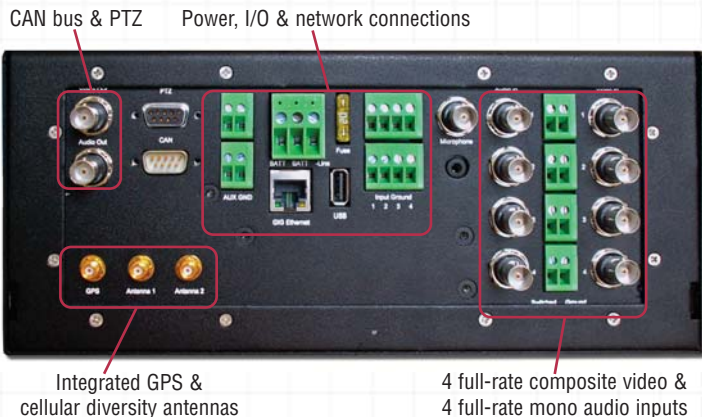
The T7714 offers a flexible array of connections. Video in/out, micro-
phone in, and audio in/out are presented via lost-cost locking female
BNCs. CAN bus and PTZ interfaces are presented on DB9 connectors
along with individual connections for GPS and diversity cellular wire-
less antenna. Individual camera power, input I/O, and power supply
inputs are via easily accessible shrouded screw terminals.

Integrated GPS &
cellular diversity antennas

4 full-rate composite video &
4 full-rate mono audio inputs

SPECIFICATIONS

Video Inputs: Accepts up to 4 composite NTSC-M or PAL format • Standard definition 525 line, 29.97 fps/PAL definition 625 lines, 25 fps • Female BNC connectors, one per input

Audio Input: Four mono line level audio inputs • Female 75-ohm BNC • Sampling from 8 to 96 kHz • Single electret microphone input on 3.5 mm jack

Audio Output: Single mono line level audio output on female BNC • Single headphone output on 3.5 mm jack

Video Ingest Resolution & Processing: Records video at D1 (704x480) size, 30 frames-per-second (fps) while simultaneously streaming at SIF (352x240) size, 15 fps. When recording is disabled, video content can be streamed at a max resolution of D1 (704x480) size, 25 fps • H.264 encoder supports D1 (720x480 or 704x480), VGA (640x480), SIF (352x240), QVGA (320x240), QSIF (172x128), & QQVGA (160x128) video resolutions at 5~30 fps.

Digital Video Recorder (DVR): Record any source • Sources independently recorded with unique time-stamped file names • Field removable & lockable media drive bay • Configurable alerts & management for media full & overwrite behavior.

Streaming: Stream & source • Sources independently streamed with unique source address • Different resolution than recorded.

Cellular/Wireless Uplink & GPS: Integrated wireless options with 1xRTT, EV-DO Rev. 0 and Rev. A, and HSPA using internal Airlink cellular modems • Full GPS 12-channel support • Real-time clock sync. • NMEA 0183 data recorded & streamed automatically • Separate TNC for primary uplink, diversity, & GPS antenna inputs

Data Connections & Camera Control: Two 10/100/1000 local Ethernet ports • RS-232 Console port • Pan/Tilt/Zoom (PTZ) control supporting two-wire R485 • Supports Rvision and Pelco D PTZ protocols on DB-9 interface

Security and Encryption: Private and encrypted tunnel between unit & central site • All remote unit data via tunnel & encrypted with all data encapsulated within the tunnel • Standard AES encryption • FIPS 140-2 compliant • Remote device firewalled to prevent unauthorized access & denial-of-service attacks • Government-use and commercial-use versions

Networking: Patton's TrinityAE™ Service Set • full TCP/IP networking • Software upgrades • Import/Export Config • CLI Framework • WMI Framework • Telnet/SSH • HTTP Server • System Monitor • Platform Manager • QoS • SSL • ACL/Firewall • Data & networking encryption

Management: Web-based GUI • CLI • Telnet & HTTP access • TFTP configuration up-& download • TFTP firmware upgrade • SNMPv1 agent, MIB II & enterprise MIB • Built-in diagnostic tools • Auto-provisioning—configuration & firmware • System status with 4 LEDs • Patton's Trinity™ CORBA IDL set

Dimensions
T7714 Unit
11.4L x 10.0W x 5.9D in. (29.0L x 25.4W x 15.0D cm)

T7714 Unit in Dock
17.3L x 12.3W x 5.9D in. (43.9L x 31.2W x 15.0D cm)

Weight
T7714 Unit: 7.6 lbs (3.4 kg)
T7714 Dock: 15.4 lbs (7.0 kg)
T7714 Unit in Dock: 23 lbs (10.4 kg)

Power
Input: 13.1VDC nominal Negative ground system • Consumption: 120W • Integrated ignition/accessory sense and activation with sleep/wake mode • Graceful shutdown on power-loss

Environment
Operating Temp: 0—85°C • Humidity: 5 to 95% , non-condensing • Vibration: 1G sine sweep; 10—500—10Hz, 1 octave per minute 3 axis • Shock: 5G-half-sine 11ms, 3 axis

Compliance
FCC Part 15 Class A (US EMC) • CE per RTTE 99/5/EC (EMC and LVD) • Safety - EN60950

Mounting Options:
Mobile: flange ears for trunk or in vehicle mounting • Fixed mount standard

TYPICAL MOBILE COMMAND CENTER KIT

T7910 Visuality Secure Command & Control Server

TYPICAL MODEL T7714 INSTALLATION

Rear Deck Installation

Portable Video Server & DVR

Visuality™ T7712 Series Secure Store-and-Stream Media Appliance

The Patton® Visuality™ Model T7712 Portable Video Server & DVR provides feature-packed, affordable mobile video for security applications, VIP protection, and situational awareness improvement.

The Model T7712 Portable Video Server & DVR is ideal for use in portable surveillance applications and fixed (unmanned) installations. The lightweight unit fits easily into a backpack and is powered for up to four hours by an internal 10.8V rechargeable battery or an external AC/DC adaptor.

The T7712 compresses and stores video inputs from up to two cameras to a removable Secure Digital (SD) card. At the same time, the T7712 transmits up to two video streams wirelessly—via the public cellular network—to a remote operations center (the headend facility).

Due to the limited bandwidth capacity of the cellular network, the wireless video stream is transmitted in low resolution, but the same video stream is also recorded in high resolution to the SD card.

The view from either camera can be viewed through the T7712's local display output. The T7712 uses built-in global positioning system (GPS) capability to add time and location data to the recorded video.

When used with Patton's Visuality™ T7910 Secure Command and Control Server (located in the headend facility), the T7712's audio/video streams frame rate, image resolution and size, along with pan, tilt, and zoom (PTZ) camera settings can be remotely controlled. A T7910 operator can ensure total and secure control of up to 24 remote units from a single point of management.
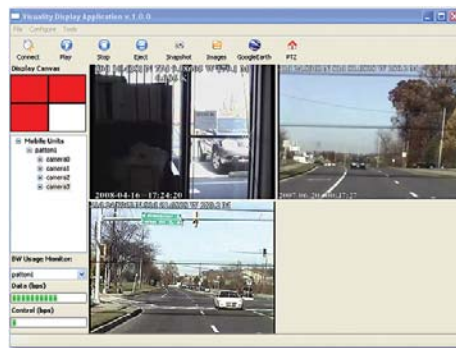
Mobile Video Server Management console powered by TrinityAE™.

The Visuality system's ability to use cellular networks for transmitting video streams and remotely controlling the T7712 makes it ideal for an almost limitless number of applications (where there's cellular coverage, you can use a T7712!). The T7712 provides the only scalable and integrated solution for video streaming, storage, and playout for mobile or fixed applications.
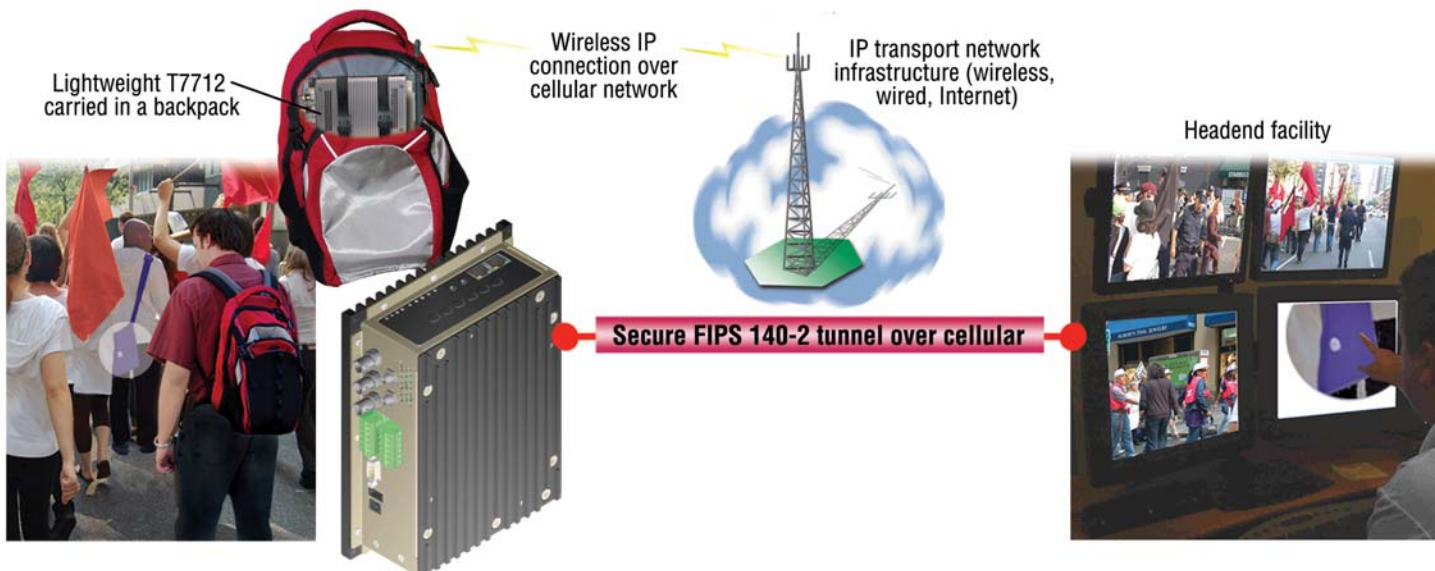
FEATURES & BENEFITS

✓ **Full Definition (704x480) and Full Frame Rate (30 fps) on All Inputs**—Records video at D1 (704x480) size, 30 frames-per-second (fps) while simultaneously streaming at SIF (352x240) size, 15 fps. When recording is disabled, video content can be streamed at a max resolution of D1 (704x480) size, 25 fps.

✓ **Flexible Video Recoding Rates**—H.264 encoder supports D1, VGA, SIF, QVGA, QSIF, & QQVGA video resolutions at 5~30 fps.

✓ **Real-Time Location & Tracking with Integrated GPS**—Acquires, records, and transports NMEA 0183 GPS location sentences both locally and via streaming. All video is time-correlated and aligned to GPS time.

✓ **End-to-End Secure Communications**—IPsec support for secure encrypted transmission of media content.

✓ **Mobile or Fixed Operation**—Use in mobile applications and stream content in real-time over cellular networks, or configure for fixed surveillance and monitoring applications.

✓ **Standard Protocols**—Supports a range of cellular technologies: 1xRTT, EV-DO Rev. 0 and Rev. A, HSPA using internal Airlink cellular modems.

✓ **Ruggedized Case**—Ready for instant deployment in covert operations. Optional weatherproof enclosure is available for outdoor installations.

✓ **Integrates with Patton's Visuality™ T7900 Series Head-End Content, Control and Management System**—Secure data tunnel termination from remote DVRs, content file indexing & local archiving, stream playout & re-streaming/broadcasting.

Typical Mobile Application

The diagram below shows the Model T7712 being used in an event/crowd security application. The field agent, wearing the T7712 in a backpack that has a pinhole camera mounted in one of the straps, has observed a potential threat in the blue bag carried by a protester in the crowd.

The video stream is securely transmitted via a cellular antenna mounted in the backpack to the headend facility where the video is analyzed to determine the likelihood of danger. Instructions can then be sent to the field agent via cell phone or the T7712's optional two-way voice communications capability.

Lightweight T7712 carried in a backpack

Wireless IP connection over cellular network

IP transport network infrastructure (wireless, wired, Internet)

Headend facility

Secure FIPS 140-2 tunnel over cellular

SPECIFICATIONS

Video Inputs: Accepts up to two composite NTSC-M or PAL format • Standard definition 525 line, 29.97 fps/PAL definition 625 lines, 25 fps • Female BNC connectors, one per input

Local Video Output: 1 female BNC jack supporting NTSC composite video for local display

Audio Input: 1 microphone input and 1 headphone output on 2.5mm standard headset jack

Audio Output: Single mono line-level audio output on female BNC • Single headphone output no 3.5 mm jack

Video Ingest Resolution & Processing: Record or stream any channel at a maximum of 640x480 30fps • 4 GB/hour per stream at maximum resolution • Configurable rates from 48x32 to 640x480 via any rate evenly divisible by 16 • Selectable 1—30 fps • Recorded & streamed channels can be con-

figured independently • MPEG4/H.264 processing, view recorded or stream files with standard client viewers

Digital Video Recorder (DVR): Record any source • Sources independently recorded with unique time-stamped file names • Field removable & lockable media drive bay • Configurable alerts & management for media full & overwrite behavior

Streaming: Stream & source • Sources independently streamed with unique source address • Different resolution than recorded

Audio/Video Streams Storage: SD card slot accepts SD or SDHC cards • T7712 records at 4 GB an hour for 1 video stream, 8 GB/hour for 2 streams

Cellular/Wireless Uplink & GPS: Integrated wireless options with 1xRTT, EV-

DO Rev. 0 and Rev. A, and HSPA using internal Airlink cellular modems • Full GPS 12-channel support • Real-time clock sync. • NMEA 0183 data recorded & streamed automatically • Separate TNC for primary uplink, diversity, & GPS antenna inputs

Data Connections & Camera Control: Two 10/100/1000 local Ethernet ports • RS-232 Console port • Pan/Tilt/Zoom (PTZ) control supporting two-wire R485 • Supports Rvision and Pelco D PTZ protocols on DB-9 interface

Security and Encryption: Private and encrypted tunnel between unit & central site • All remote unit data via tunnel & encrypted with all data encapsulated within the tunnel • Standard AES encryption • FIPS 140-2 compliant • Remote device firewalled to prevent unauthorized access & denial-of-service attacks •

Government-use and commercial-use versions

Networking: Patton's TrinityAE™ Service Set • full TCP/IP networking • software upgrades • import/export config • CLI framework • WMI framework • Telnet/SSH • HTTP server • system monitor • platform manager • QoS • SSL • ACL/firewall • data & networking encryption

Management: Web-based GUI • CLI • Telnet & HTTP access • TFTP configuration up- & download • TFTP firmware upgrade • SNMPv1 agent, MIB II & enterprise MIB • Built-in diagnostic tools • Auto-provisioning—configuration & firmware • System status with 4 LEDs • Patton's Trinity™ CORBA IDL set

Weight
5.0 lbs (2.3 kg)

Dimensions
8.5L x 6.5W x 2.9H in. (21.6L x 16.5W x 7.4D cm)

T79XX Series Headend Server

Power
Rechargeable Lithium-ion battery provides up to 4 hours of continuous operation • AC/DC adaptor for charging and operation

Compliance
FCC Part 15 Class A (US EMC) • CE per RTTE 99/5/EC (EMC and LVD) • Safety - EN60950

Environment
Operating Temp: 0—85°C • Humidity: 5 to 95% , non-condensing • Vibration: 1G sine

sweep; 10—500—10Hz, 1 octave per minute 3 axis • Shock: 5G-half-sine 11ms, 3 axis

Capabilities when paired with T79XX series headend server:
Over-the-air remote control and configuration of T7712 • GPS location of T7712 can be mapped on Google™ Earth application • Support for two-way voice communication

Command Center

Headend Control and Management System Server

Visuality™ T7900 Secure Command and Control Server

The Model T7900 provides an operator with total and secure control of all remote Visuality surveillance assets from a single point of management. Full IPsec tunnel termination provides secure access and remote control over T771X remote units.

The T7900 performs as the gatekeeper of the Visuality system. When used with Patton's Visuality™ T771X remote units, a T7910 operator can have total and secure control of up to 24 remote units from a single point of management. It provides a comprehensive picture of all field units, their configuration settings, and status.

The T7900 terminates encrypted tunnels (IPsec using 256-bit AES encryption), and combines incoming audio-visual and GPS data, making it available to authorized users over the local network.

All command-and-control traffic is sent over encrypted tunnels, ensuring end-to-end security.

The GPS data is formatted for use with the Google® Earth™ Geographic Information System

(GIS) which enables the T7900 to display the locations of T771X remotes—in real-time—overlaid onto street maps and satellite imagery.
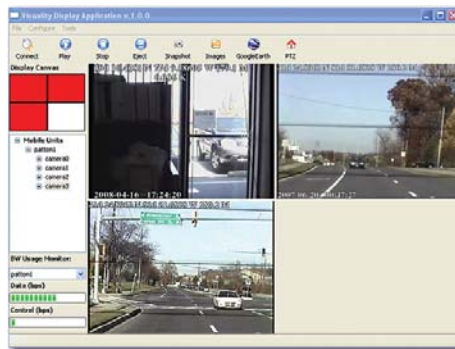
Mobile Video Server Management console powered by TrinityAE™.

The T7900 is a full-fledged edge-router, VPN, and firewall solution running Patton's Trinity Application Environment (TrinityAE™) operating system. It provides integrated authentication and authorization of users, IP interface, and routing configuration, DNS and DHCP servers, and quality of service (QoS) management.

Users can monitor T771X remotes in real-time from the Web Management Interface (WMI) page of the primary T7900 server. From the WMI, users can update the database of registered T771X remotes to add or remove remotes, and assign remotes to primary or secondary T7900 servers. The WMI page also includes status of the T771X remotes.

For the most demanding surveillance applications, Patton's Visuality T7900 Secure Command and Control Server, when used with T771X remotes, offers the only scalable, integrated solution that provides streaming, storage, and playout for mobile or fixed applications.


FEATURES & BENEFITS

✓ **Command and Control Assets From a Single Server**—a T7910 operator can have total and secure control of up to 24 remote units from a single point of management.

✓ **Real-Time Location & Tracking with Integrated GPS**—Integration with Google Earth GIS enables T7900 to display locations of T771X remotes, in real-time, overlaid onto street maps and satellite imagery.

✓ **Command Shift™ Technology—**Using Command Shift, you can quickly transfer T771X assets from one T7900 Command Server to another on an *ad hoc* basis

✓ **End-to-End Secure Communications**—IPsec support for secure encrypted transmission of media content and command-and-control traffic.

✓ **Ruggedized Case**—Ready for instant deployment in covert operations.

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The T7900 is the gatekeeper for the headend system. It terminates the VPN connections originating from remote T771X units and remote user equipment, such as Personal Digital Assistants (PDAs) and provides end-to-end secure connectivity between them. It aggregates the audio-visual content and GPS data coming from the remote units and distributes it over the local network. It resolves and distributes command and control information emanating from user applications.
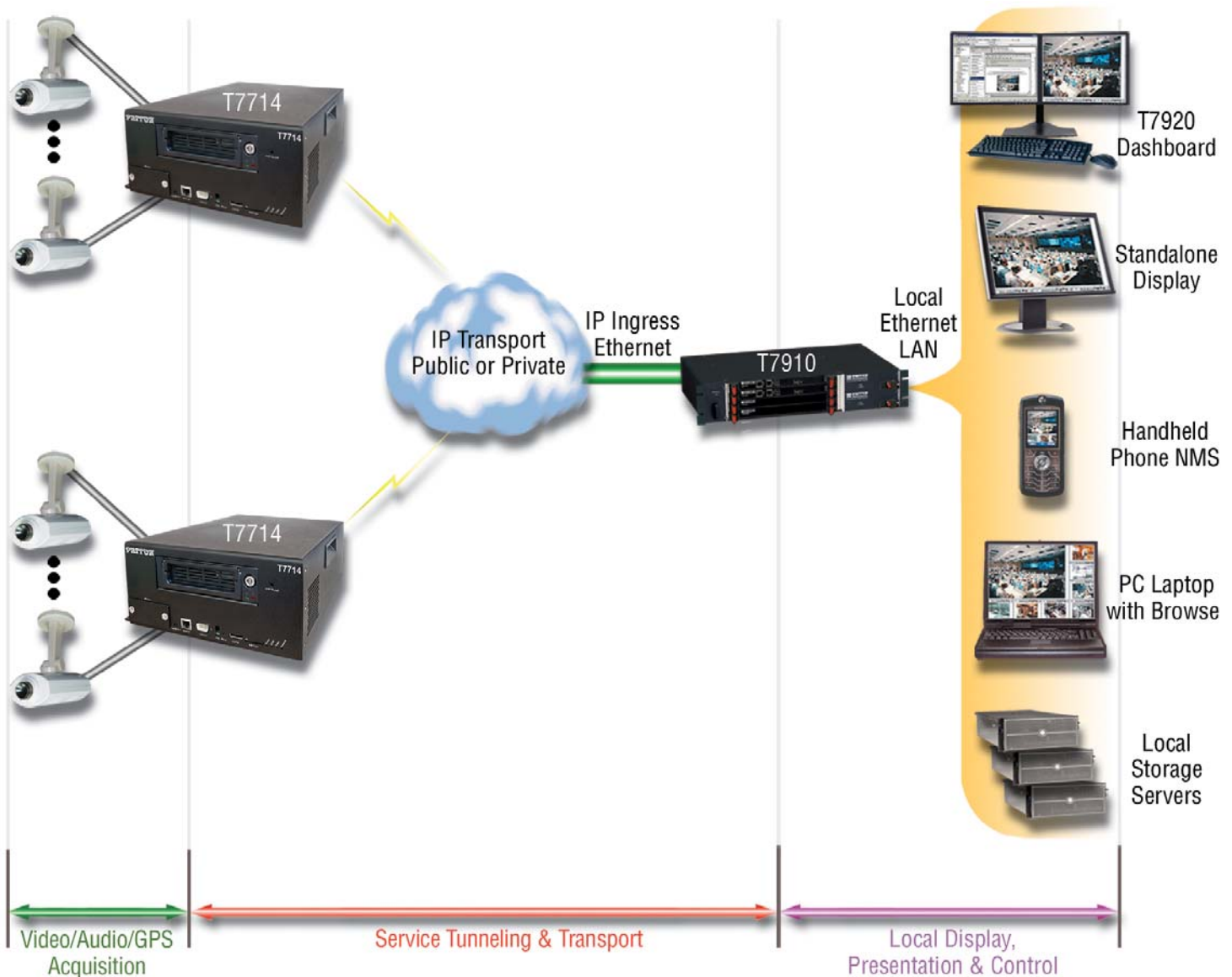
SPECIFICATIONS

Processor: Dual-Core Intel® Xeon® LV Processor

Speeds: 1.6, 2.0GHz

Chipset: Intel® 3100 Chipset

FSB: 667-MHz Front Side Bus, 33-bit/33MHz cPCI Bus interface

Video: Via PMC

Memory: 2 DDR2-400 SO-DIMM sockets; 512MB to 4GB of total DDR2

Ethernet: (2) 100/1000 Ethernet Interfaces on 2.16 Switched Fabric;10/100/1000 Ethernet Interface

Serial: Serial ATA, Serial Port

PMC: (1) 64-bit/133MHz PMC site

USB: (2) High Speed USB Ports

BIOS: PCI 2.2 AMI

PATTON

Network Access & Connectivity Solutions for Enterprise, Carrier & Industrial Applications

Mobile Video Visuality™
For Enhanced, Real-Time Situational Awareness

Ethernet Extenders CopperLink™
Going the Distance

Device Servers EtherBITS™
Industrial Device Networking

Patton Electronics—a leader in the production of network access and connectivity products—is building on its expertise in integrated network access, transmission, IP and Frame Relay technologies and leading in the development of right-priced products to simplify human and machine access to the global network.

The Patton brothers, Bobby and Burt, founded Patton Electronics in 1984, while students in college. Over the succeeding 20+ years, Patton has taken those simple beginnings and expanded into a multi-national manufacturing company that today employs more than 180 people and provides a product line in excess of 1000 items.

For your next project that needs to meet aggressive price points, while delivering high performance results, call on Patton. We're ready to deliver!

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Line Drivers QuikConnect™
Line Drivers & Short Range Modems

Voice-Over-IP SmartNode™
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WAN Aggregation ForeFront™
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