Body-Worn Video Cameras with Automatic Activation Capabilities

Market Survey Report

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FOREWORD

The National Urban Security Technology Laboratory (NUSTL) is a federal laboratory within the U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T). Located in New York City, NUSTL is the only national laboratory focused exclusively on supporting the capabilities of federal, state, local, tribal, and territorial responders to address the homeland security mission. The laboratory assists responders with the use of technology to prevent, protect against, mitigate, respond to, and recover from homeland security threats and incidents. NUSTL provides expertise on a wide range of subject areas, including chemical, biological, radiological, nuclear, and explosive detection, personal protective equipment, and tools for emergency response and recovery.

NUSTL manages the System Assessment and Validation for Emergency Responders (SAVER) program, which provides information on commercially available equipment to assist response organizations in equipment selection and procurement. SAVER knowledge products provide information on equipment that falls under the categories listed in the DHS Authorized Equipment List (AEL), focusing primarily on two main questions for the responder community: "What equipment is available?" and "How does it perform?" The SAVER program works with responders to conduct objective, practitioner-relevant, operationally-oriented assessments and validations of commercially available emergency response equipment. Having the right tools provides a safer work environment for responders and a safer community for those they serve.

NUSTL is responsible for all SAVER activities, including selecting and prioritizing program topics, developing SAVER knowledge products, and coordinating with other organizations to leverage appropriate subject matter expertise. In conjunction with DAGER Technology, LLC, NUSTL conducted a market survey of commercially available body-worn video cameras with automatic activation. This equipment falls under the AEL reference number 13LE-00-SURV titled Law Enforcement Surveillance Equipment.

SAVER reports are available at www.dhs.gov/science-and-technology/saver-documents-library.

Visit the NUSTL website at www.dhs.gov/science-and-technology/national-urban-security-technology-laboratory or contact the lab at NUSTL@hq.dhs.gov.

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EXECUTIVE SUMMARY

Emergency responders use body-worn cameras while on duty to record their actions and their interactions with fellow responders and the public. These cameras can be used by all responder disciplines to ensure transparency, preserve evidence, monitor personnel, document interactions, increase the accuracy of written reports, provide a training tool for professional development, and improve standard operational procedures. Cameras may also deter aggressive behavior.

Between December 2021 and September 2022, the National Urban Security Technology Laboratory's System Assessment and Validation for Emergency Responders (SAVER) program conducted a market survey and a comparative product assessment of commercially available body-worn cameras that feature automatic activation technology. The SAVER team conducted additional research in October 2023 to update products before the publication of this report.

Cameras with automatic activation capabilities start recording without direct user activation based on inputs from external sensors. Common automatic activation triggers include activating emergency lights or sirens on a vehicle, suddenly braking or accelerating a vehicle, unholstering a firearm or conducted-energy weapon, and being in proximity to another camera that has been activated. This market survey report is based on information gathered from manufacturer and vendor websites, internet research, industry publications, and a government-issued request for information that was posted on the System of Award Management website. The SAVER program identified 21 products from 14 manufacturers.

Body-worn camera (BWC) hardware featuring automatic activation technology may be a costly initial investment, but many agencies have discovered that ongoing video review and storage costs are far larger budget items. Because of the complexity of data management and storage, most body-worn camera vendors offer integrated data solutions as part of their systems. Vendors often integrate software as a service (SaaS) subscriptions with BWC packages, typically using a monthly, per-unit fee. Depending on the size and complexity of agencies' BWC systems, infrastructure upgrades like data access points and radio system upgrades may be required to implement state-of-the-art technologies. Agencies may need to reassign or hire additional personnel to review body-worn camera footage to comply with local regulations on data retention and privacy. Because manufacturers have differing requirements for implementation, the cost models described in this report vary. Agencies are encouraged to contact vendors for accurate pricing data and to fully explore all potential costs, including the hardware, software, data storage, and video review expenses associated with BWC procurement.

This market survey is intended to provide emergency responders with information to guide the operational and procurement decisions they make for emergency response agencies. Emergency responders should consider the overall capabilities, technical specifications, and limitations of body-worn cameras with automatic activation features in relation to their agency's operational needs when making equipment selections. The SAVER program did not independently verify the performance of these products or the information included in this report

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1.0 INTRODUCTION

Emergency responders use body-worn cameras (BWCs) while on duty to record their actions and their interactions with fellow responders and the public. These cameras can be used by all responder disciplines to ensure transparency, preserve evidence, monitor personnel, document interactions, increase the accuracy of written reports, provide a training tool for professional development, and improve standard operational procedures. Cameras may also deter aggressive behavior.

A nationwide focus on transparency in policing has increased the number of agencies exploring the use of BWCs. On May 25, 2022, a presidential directive, *Executive Order on Advancing Effective, Accountable Policing and Criminal Justice Practices to Enhance Public Trust and Public Safety* mandated that federal law enforcement agencies that regularly conduct patrols or routinely engage with the public in response to emergency calls develop and implement policies and programs requiring officers to use BWCs [1].

Between December 2021 and September 2022, the System Assessment and Validation for Emergency Responders (SAVER) program conducted a market survey and a comparative assessment of BWCs for emergency responders. The SAVER team conducted additional research in October 2023 to update products before the publication of this report. This market survey report is based on information gathered from manufacturer and vendor websites, internet research, industry publications, and a government-issued request for information posted on the System of Award Management website. The U.S. Department of Homeland Security, Science and Technology Directorate's Technology Scouting Group also contributed to the market research used in the development of this report.

Products included in this report meet the following criteria:

- Commercially available
- Designed to be worn on a responder uniform
- Overt in nature
- Capable of recording both audio and video
- Feature automatic activation capabilities

Due diligence was performed to develop a report that is representative of products in the marketplace.

2.0 BODY-WORN CAMERAS OVERVIEW

Body-worn cameras consist of a camera, microphone, power source, and data storage, as well as a mounting mechanism that allows the user to place the unit in various locations on their uniform. These cameras have the capability to record video and audio, which may then be viewed—in some cases immediately—via a smartphone application or directly on the camera's display. The camera's software enables video playback, authenticates data, manages user rights, ensures chain-of-custody record keeping, and improves the quality of recorded data. This report focuses on BWCs that automatically activate recording based on signals transmitted wirelessly from critical event sensors. Such devices have also been denoted "Incident-Driven Video Recording Systems (IDVRS)" in federal law enforcement applications.

2.1 Key Components

2.1.1 Camera Unit

BWCs digitally capture video and audio recordings that document the actions of the individual wearing the camera and those with whom they interact. To capture audio recordings, camera units are equipped with built-in microphones or inputs for external microphones. Many cameras allow users to mute the microphone. Most BWCs are equipped with visual indicators that show system status (i.e., on, off, live streaming) and battery status and with a recording indicator to provide the available data storage capacity. Some BWCs comprise two components connected by a wire, one containing the battery and electronics and another housing the imaging sensor (see Figure 2-1).

Figure 2-1 Two component BWC.

Image Credit: Axon Enterprise, Inc.

The field of view (FOV) of a camera is the extent of the observable world imaged at any given moment. FOV is typically expressed in degrees of arc with the camera lens as the vertex. FOV may be reported by the manufacturer in horizontal, vertical, or diagonal degrees. Some cameras have adjustable aspect ratios that may impact the FOV recorded to the digital storage media. Cameras and human eyes image the world differently, so FOV is not perfectly analogous to the human visual field. However, for general comparison, humans typically have a reported visual field of 180–220 degrees horizontally and 150 degrees vertically.

Video quality is influenced by the camera's resolution, lux rating, and frame rate. Resolution describes the number of pixels in the horizontal and vertical axis of the image produced. For common resolutions, resolution is often described using only the vertical number of pixels. For example, the resolution of 1920x1080 might be described as simply 1080p.[1] This nomenclature typically assumes a standard aspect ratio of horizontal pixels to vertical pixels of 16:9.

Many cameras support recording at more than one resolution. If this is the case, the user can select a resolution in the settings. The resolution setting impacts the total on-device recording time available because of data storage limitations and may affect the battery drain rate in some systems.

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[1] The "p" denotes that the camera sensor uses progressive scanning, meaning the entire image is updated in each frame. All BWCs cited in this report use progressive scan resolution.

Manufacturers will often cite a camera's lux rating, which specifies the amount of light (in units of lux, or lumens per square meter) required for a camera to produce an "acceptable image." The lower the lux rating, the less light is needed to obtain a clear image. Because an "acceptable image" is subjective, lux rating is not an objective measurement of low-light performance, and devices cannot be compared based solely on their lux rating [2]. Cameras with larger imaging sensors tend to have better low-light performance. Because first responders often work in low-light conditions, some BWCs are equipped with infrared (IR) illuminators to improve low-light performance. Some systems may have low-light sensitivity that exceeds the sensitivity of the human eye, a factor for consideration when comparing what the camera is able to record against what the responder wearing the camera is able to see.

Frame rate describes how many individual images (frames) are recorded by the camera in a one-second period. Higher frame rates capture motion better but use more storage and power. Thirty frames per second (fps) is a common frame rate for digital video. For comparison, surveillance cameras that record continuously will often use a lower frame rate, such as 15 fps, to reduce storage needs. Where multiple frame rates are mentioned for a product in this report, it means the user can select which frame rate to use in the settings.

2.1.2 Power Source

BWCs are usually powered by rechargeable batteries. The maximum runtimes for the cameras included in this market survey range from 8 to 16 hours. These cameras may be powered by user-replaceable or non-replaceable batteries. When built-in/non-replaceable batteries can no longer hold a charge, the unit must be returned to the vendor for service or replaced. Some BWCs separate the battery and other components from the imaging sensor. The two components are then connected by a wire. This allows the imaging portion to be smaller and for the battery and digital video recorder to be worn on the officer's duty belt.

2.2 Additional Considerations

2.2.1 Data Storage

BWCs may store data onboard the unit in non-removable data storage or in a removable memory card. Some units feature Wi-Fi connectivity to allow the camera to upload video to a local or cloud-based evidence management system. Others have cellular connections, allowing real-time streaming of video to a cloud server to preserve evidence should the camera get destroyed. Subscriptions are often required for cloud-based features. Many systems allow data to be automatically uploaded when a camera is placed in a charging dock. See Section 2.4 for more information on regulations around storing body-worn camera footage.

2.2.2 Connectivity

BWCs offer a variety of options to transmit and receive data. This connectivity can be used to trigger recordings, track the camera's location, update software, download video content from the camera, or to communicate between officers and dispatch centers. Some of the options available include 5G or Long-Term Evolution (LTE) cellular capability, Bluetooth (BT), Global Positioning Systems (GPS) (a satellite system used to pinpoint the geographic location of a user's receiver), Land Mobile Radio (LMR), Near-Field Communication (NFC), Radio Frequency Identification (RFID), or Wi-Fi features, which typically manage data and data transfer. LMR connectivity refers to the ability of a camera to transmit data via an officer's portable or in-car radio system.

Most systems also include the ability to connect to servers via a hardwired dock at the station or in a vehicle, which is useful for transferring bulk data like video footage.

2.2.3 Mounting Hardware

BWCs are compact and lightweight, allowing them to be worn on responder's uniforms. Cameras may be affixed to a responder's shirt front, hat, helmet, glasses, or arm via a clip, harness, lanyard, headband, armband, magnetic mount, or modular lightweight load-carrying equipment (MOLLE) accessory (see Figure 2-2). If the camera is split into two pieces, as mentioned in 2.1.1, the user must decide where to mount each piece. Some units have wires, with the intent that the user will wear the battery component on their belt and mount the camera portion on their chest.

Figure 2-2 BWC attached by a magnetic mount.

Image Credit: Ryan Johnson, Police body cam, CC BY-SA 2.0.

2.2.4 Software

To maintain the chain of custody of video evidence, software may incorporate security measures to prevent tampering with or deleting data. For example, although users can tag video as related or unrelated to an incident, or as an accidental activation, they cannot delete footage from the device. BWCs may also feature built-in GPS receivers, which allow them to automatically record the coordinates where a video was recorded. This feature can be turned off in the settings.

2.3   Automatic Activation

Due to the difficulty of storing massive quantities of video footage and the impact on battery life, most BWCs do not continuously record. The onus of activating the camera has typically fallen on the wearer, who may be occupied with other duties and so forget or be unable to activate the camera. In addition to manual activation, many BWCs have the option to automatically start recording based on input from one or more sensors. Some sensors used for activating a recording are built into the camera, while others are installed within a vehicle or attached to the wearer and connect wirelessly. Most cameras also have a configurable pre-event buffer, which records a short amount of time before the device was activated, allowing them to capture the event that caused the camera to start recording, not just the aftermath. The issuing agency can configure their implementation of automatic camera triggers and pre-event buffers at their discretion.

The wireless communication protocols used to connect the sensor to the camera to activate recordings can vary by manufacturer. Bluetooth Low Energy (BLE) beacons mounted in police vehicles or in BWCs are commonly used to transmit activation signals to other responders' on-scene BWCs. BLE allows triggering sensors to be low power and avoids the need to pair every camera to every beacon. Some manufacturers use a Wi-Fi connection to an in-vehicle video system or use proprietary wireless protocols to activate cameras. Manufacturers who sell both BWCs and in-vehicle camera systems often integrate the systems, so a manual or trigger-based activation of one camera system will start the other and synchronize the time recorded in the videos. This allows for the capture of multiple camera angles of an incident, increasing the probability that a camera captures critical information. If this functionality is desired, first responders should consider purchasing/upgrading the two systems at the same time because interoperability between manufacturers is not common.

The activation methods described in sections 2.3.1–2.3.6 are tied to an officer's vehicle. To use vehicle-based triggers, agencies typically must install a sensor hub in the vehicle. The sensor hub ties into and draws power from existing circuits in the vehicle. The proximity to recording cameras sensors described in Section 2.3.7 can be tied to either vehicle mounted cameras or BWCs. The triggers described in sections 2.3.8–2.3.11 are based on sensors worn on the body, either within the camera itself or attached to specific places on the uniform; the latter require separate power supplies. Computer-Aided Dispatch (CAD) and geofencing triggers may require manual intervention by dispatch personnel to set the necessary conditions for the automatic recording to start.

2.3.1 Emergency Lights/Siren

This sensor is triggered when the user activates the emergency lights or sirens in their patrol vehicle. The use of these car systems typically indicates that the responder is heading toward an emergency, conducting a traffic stop, or interacting with the public in another official capacity. This trigger may or may not be desirable, depending on the presence of a separate in-car video system such as a dashboard camera.

2.3.2 Vehicle Acceleration

An emergency responder may accelerate their vehicle in response to a call for backup or to pursue a suspect. Regardless of the specific reason, accelerating rapidly typically indicates that the responder is heading toward an emergency incident. When a BWC is triggered by acceleration, the camera will begin recording while the responder is driving.

2.3.3 Vehicle Speed

High vehicle speed may also indicate that the responder is heading toward an emergency in response to a call for service or to pursue a suspect. When vehicle speed is used as a trigger, the camera will begin recording while the responder is driving.

2.3.4 Vehicle G-Force

G-force sensors monitor abrupt changes in motion. They are typically triggered by similar situations to acceleration sensors, such as rapid acceleration or deceleration like that in a motor vehicle accident. Either of these might indicate an incident like a crash has occurred and recording should begin.

2.3.5 Vehicle Long-weapons Mount

Many police vehicles have a fixed, locking mount for a shotgun or patrol rifle in the forward passenger compartment. These mounts typically have a hidden, remote button that releases the lock and enables the officer to remove the weapon from the mount. Some camera systems offer the option of activating the vehicle cameras and BWCs when the long-weapons mount is unlocked.

2.3.6 Opening Vehicle Door

Door opening sensors trigger activation when a responder opens the door of their vehicle but are typically combined with another sensor, such as the emergency lights, in a logical configuration such as "begin recording when driver exits the vehicle if the emergency lights are active." When an emergency responder opens their vehicle door with the emergency lights on, this typically indicates they have arrived at a situation where their presence was requested or because they saw an incident they needed to respond to. Applying this logic to the trigger means no unnecessary footage is filmed on the way to the location, preventing unnecessary recordings when emergency responders leave their vehicle for innocuous reasons, such as heading back to their duty station, helping citizens in non-emergency situations (e.g., minor car issue or loose animal), or stopping for a meal during their workday.

2.3.7 Proximity to Recording Camera

Proximity sensors can activate a camera that is not recording when it comes close to another BWC or in-car camera that is recording. This increases the probability that an incident captured by one camera is captured by all compatible cameras on the scene.

2.3.8 Weapon Deployment

Weapon deployment sensors activate cameras when an officer removes their firearm or conducted-energy weapon from its holster. Agencies can select a specially made holster with a proximity sensor built in or sensors that attach to a regular holster. Some manufacturers offer proprietary holsters and sensors while others are compatible with aftermarket products.

Aftermarket sensors are available that continually monitor the presence of the officer's sidearm within the holster and, when the weapon is drawn, emits a Bluetooth signal to activate compatible BWCs. These are compatible with most duty holsters. These sensors have a rechargeable battery good for 14–21 days and can be recharged via micro-USB. There are also various holsters with integrated sensors for a conducted electrical weapon or pepper spray canisters.

2.3.9 Officer Down

A sensor integrated in the BWC can trigger activation when it detects that the wearer is in a prone position or lies flat for a set number of seconds, with the duration configurable by the agency. The system starts recording, issues an alert to dispatch via a cellular connection, and in some systems allows live streaming from the camera, enabling dispatch and command staff to see, in real-time, the situation facing the first responder.

2.3.10 Computer Aided Dispatch Activation

BWCs that have connectivity to a CAD center, typically via cellular service, often have the ability for dispatchers or patrol supervisors to remotely activate cameras, such as when an officer requests assistance, officers are traveling to a report of a violent event, and for civil unrest deployments. BWC CAD activation can also be used in conjunction with geofencing.

2.3.11 Geofencing

The advent of BWC systems with both GPS receivers and cellular connectivity has enabled some manufacturers to offer GPS-based triggers. These systems typically enable the agency to define geographic areas that will trigger the activation of any camera entering the defined perimeter. Systems integrated with CAD allow dispatchers to dynamically set a geofence around a location of a call-for-service, enabling an agency to ensure all responders on a particular scene have activated cameras.

2.3.12 Other Triggers

Some manufacturers offer triggers that are unique to their brand or are uncommon across the market. As BWC technology advances, manufacturers are delving into activation mechanisms like foot pursuit detection using accelerometers, gunshot detection, license plate reader and facial recognition technologies that trigger on wanted vehicles and suspects, and officer injury sensors. Manufacturers are also exploring using artificial intelligence to detect visual and audio cues that indicate a pending or active critical incident. The individual product summaries in Section 3 indicate which vendors are offering these technologies and with which BWCs and subscriptions.

2.4 Standards/Regulations

Standards for ingress protection (IP) are defined by the International Electrotechnical Commission (IEC) Standard IEC 60529. This standard classifies the degree of protection provided by mechanical casings and electrical enclosures against the intrusion of dust and liquids. A table providing a full explanation of IP ratings can be found in Appendix A.

When used for a law enforcement application, BWCs must ensure evidence is properly captured, stored, and managed. Governing rules of evidence require that video and audio evidence portray events fairly and accurately. This requirement can typically be satisfied by testimony from the manufacturer regarding proper operation and handling of their equipment and testimony from the officer that the video accurately represents the event as it occurred. As such, agencies should understand their local rules of evidence before purchasing BWCs if intending to use recorded video as a third-party witness.

For purposes of the Federal Bureau of Investigation's (FBI) Criminal Justice Information Services (CJIS) Security Policy, BWC footage is often considered criminal justice information. Therefore, organizations subject to CJIS must ensure BWC footage is stored and disseminated in accordance with CJIS policy. This includes storage on local infrastructure and in any cloud service provided by the manufacturer or a third party [3].

When used for emergency medical or fire service applications, BWCs may capture private medical information. The Health Insurance Portability and Accountability Act governs the maintenance of personally identifiable information and protected health information by the healthcare and health insurance industries. Prior to purchase, agencies should ensure they have policies in place that govern how and when recordings are made, viewed, stored, and deleted to protect video and audio data from improper release or transmission.

2.5 Use of Grant Funds for Certain Telecommunications and Video Surveillance Equipment or Services

The John S. McCain National Defense Authorization Act for Fiscal Year 2019 (NDAA), Pub. L. 115-232, Section 889 (NDAA) prohibits the use of federal funds, including loan and grant[2] funds, to obtain or acquire certain telecommunications technologies manufactured by certain entities or to enter into contracts with entities that use those technologies. The Office of Management and Budget (OMB) published regulations at 2 C.F.R. § 200.216 to clarify the application of the NDAA to the use of federal grant funds to procure or obtain certain telecommunications equipment or services.

Effective August 13, 2020, federal grant recipients and subrecipients (i.e., **non-federal entities**) are prohibited from obligating or expending loan or grant funds to procure or obtain[3] the following "covered telecommunications equipment or services":

- Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities)

For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by:

- Hytera Communications Corporation
- Hangzhou Hikvision Digital Technology Company
- Dahua Technology Company
- or any subsidiary or affiliate of such entities
- Other entities identified by the Secretary of Defense

The restriction also applies to systems that use the covered equipment or services as a substantial or essential component, and to subsidiaries or affiliates of those listed above[4]. See www.federalregister.gov/d/2020-17468/p-877.

Costs associated with covered equipment and services are "unallowable" for grant funding. Grant recipients are responsible for ensuring funds are used only for allowable costs, and would be obligated to refund the government for unallowable costs. The Federal Emergency Management Agency (FEMA) issued FEMA Policy #405-143-1, Prohibitions on Expending FEMA Award Funds for Covered Telecommunications Equipment or Services (Interim) for further guidance on the Section 889 prohibitions. Additionally, OMB issued frequently asked questions (FAQs) on the topic.

For **federal** entities, FEMA published interim rules amending the Federal Acquisition Regulation[5].

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[2] This also includes cooperative agreement funds.
[3] Nor may they extend or renew a contract to procure or obtain, or enter into a contract to procure or obtain the covered equipment or services.
[4] As well as telecommunications or video surveillance services provided by entities or using equipment described above.
[5] www.federalregister.gov/documents/2019/12/13/2019-26579/federal-acquisition-regulation-prohibition-on-contracting-for-certain-telecommunications-and-video and www.federalregister.gov/documents/2019/08/13/2019-17201/federal-acquisition-regulation-prohibition-on-contracting-for-certain-telecommunications-and-video.

3.0   PRODUCT INFORMATION

This report provides information on 21 body-worn cameras that can be activated via automatic triggers. These products are listed alphabetically by manufacturer in Table 3-1 and Table 3-2, which provide general product characteristics and specifications. Product information presented in this report was obtained directly from manufacturers, vendors, and their websites from December 2021 to October 2023. The SAVER program has not independently verified the information.

Table 3-1 uses a check mark to indicate whether a product can be automatically activated via the listed trigger. The presence of an en dash (–) means that trigger is not available. In addition to the types listed, any unique triggers are described within the individual product descriptions. Some manufacturers did not provide an exhaustive list of all possible triggers for their product.

The **automatic activation triggers** that appear as columns in Table 3-1 are:

- Emergency Lights/Siren
- Vehicle Acceleration
- Vehicle Speed
- G-Force
- Opening Vehicle Door
- Unholstering Firearm (or Conducted Energy Weapon)
- Proximity to Recording Cameras
- Officer Down
- CAD Activation
- Geofencing
- Other/Not Specified
  A check mark under "Other/Not Specified" indicates that the manufacturer states their camera offers automatic activation but either offers a trigger that is unique or did not provide a complete list of every available trigger. (See the product description for details.)

Table 3-1 Product Comparison Matrix: Automatic Activation Capabilities

Manufacturer, Product	Emergency Lights/Siren	Vehicle Acceleration	Vehicle Speed	G-Force/Crash	Opening Door	Unholstering Firearm	Long-weapons Mount	Proximity to Recording	Officer Down	CAD Activation	Geofencing	Other/Not Specified†
Axon Enterprise Inc., Axon Body 3 AX1023	✓	✓*	✓	✓	✓	✓	✓	✓	–	✓	–	✓
Axon Enterprise Inc., Axon Body 4	✓	✓*	✓	✓	✓	✓	✓	✓	–	✓	–	✓
Digital Ally, FirstVu Pro	✓	✓	✓	✓	✓	–	✓	✓	–	✓	✓	✓
Getac Video Solutions, BC-03	✓	✓	✓	✓	✓	–	✓	✓	–	✓	✓	–
iPro, BWC-4000	✓	–	–	✓	✓	✓	✓	–	–	–	–	✓
Kustom Signals, Argus	–	–	–	–	–	–	–	–	✓	–	–	✓
Kustom Signals, Eyewitness Vantage	✓	–	–	–	✓	✓	–	✓	–	–	–	✓
LensLock, Eagle 13	✓	–	✓	✓	✓	✓	✓	✓	–	–	–	✓
LensLock, Genesis 12.5	✓	–	✓	✓	✓	✓	✓	✓	–	–	–	✓
Motorola Solutions, VB400	–	–	–	–	–	✓	–	✓	–	–	–	✓
Motorola Solutions, V300	✓	–	✓	✓	✓	✓	✓	–	✓	–	–	✓
Motorola Solutions, V700	✓		✓	✓	✓	✓	✓		✓			✓
Pro-Vision, Bodycam 4	✓	–	–	–	–	–	–	✓	–	–	–	–
Reveal Media, D6 (D7)	–	–	–	–	✓	✓	–	–	–	–	–	✓
Reveal Media, K6 (K7)	–	–	–	–	✓	✓	–	–	–	–	–	✓
Safe Fleet, FOCUS X2	✓	–	–	✓	✓	–	✓	–	–	–	–	✓
Sentinel Camera Systems, LLC, Protector II	–	–	–	–	–	–	–	–	–	✓	–	✓
Utility Associates Inc., EOS	✓	–	–	✓	✓	✓	✓	–	✓	✓	✓	✓
Visual Labs, Smartphone Body Camera Solution	✓	–	✓	–	–	✓	–	✓	✓	✓	✓	✓
WOLFCOM, Commander	–	–	–	–	–	✓	–	–	–	✓	–	✓
WOLFCOM, Halo	–	–	–	–	–	✓	–	–	–	✓	–	✓

* When used in conjunction with Axon Fleet 2 or Fleet 3 systems
† Product may work with an additional, unique trigger and/or vendor has not published an exhaustive list of their triggers.

Product information in Table 3-2 is defined as follows.

IP Rating: The ingress protection (IP) rating identifies the level of protection an electrical enclosure provides against environmental conditions, including solids and liquids. The first digit indicates the protection level against solids and the second digit indicates the protection level against liquids. For example, in an IP54 rating, the "5" means that the tool is dust-protected (but not dust tight), and the "4" means that the tool can withstand water splashing from any direction. Appendix A describes the ratings in full. For products where IP rating information was not available "—" is indicated in the table.

Connectivity Source indicates whether a camera offers 5G or LTE cellular, BT, GPS, LMR, NFC, RFID, or Wi-Fi features. LMR connectivity refers to the ability of a camera to transmit data via an officer's portable or in-car radio system. Most systems include an ability to connect via a dock at the station or in a vehicle.

Dimensions indicates the product's height, width, and depth (in that order), reported in inches (in.).

Weight indicates the product's total weight, reported in ounces (oz.).

Approximate Diagonal Field of View indicates the angles from the camera lens for which the camera can observe and record the outside environment. Manufacturers may specify horizontal, vertical, or diagonal field of view specifications. The reported or an approximate diagonal field of view is provided for ease of reference. The actual reported field of view data, if available, is provided in the individual product write-ups.

Maximum Video Resolution indicates the maximum number of horizontal lines of resolution the camera can record. The camera may offer multiple user-selectable video resolutions. All camera resolutions provided have a "p" following the resolution because each camera sensor uses progressive scanning, meaning the entire image is updated in each frame.

Video Frame Rate indicates available frame rates. Frame rate describes the number of individual frames (images) present in one second of video footage. Higher frame rates render smoother motion playback but use more storage space. Where multiple frame rates are listed, the user can select which one to use in the camera's settings.

Battery Runtime indicates the maximum amount of time the product can operate continuously before the battery needs to be replaced or recharged. Maximum runtime may depend on factors like the chosen video resolution and the use of Wi-Fi or cellular connectivity.

Onboard Storage indicates the amount of available onboard data storage included with purchase, reported in gigabytes (GB). If a product also supports cloud storage, this column is marked with an asterisk. The size of a video file of a given length can vary based on user settings and how the manufacturer designed the video file.

Playback Display indicates whether the product features a built-in display capable of video playback.

Audio Mute Capability indicates whether the product has the capability for the user to mute audio recording.

Pre-event Buffer indicates whether the camera can record footage for a defined period prior to an activation trigger. If a range of numbers is listed, the setting is configurable by the agency.

Table 3-2 Product Comparison Matrix: Other Specifications

Manufacturer, Product	IP Rating	Connectivity Sources	Dimensions (in.) (h x w x d)	Weight (oz.)	Approximate Diagonal Field of View (degrees)	Maximum Video Resolution (p)	Video Frame Rate (fps)	Battery Runtime (hours)	Onboard Storage (GB)	Playback Display	Audio Mute Capability	Pre-event Buffer
Axon Enterprise Inc., Axon Body 3 AX1023	67	BT, Wi-Fi, LTE, GPS	3.8 x 2.6 x 1.2	6.9	146.4	1080	30	12+	64*	–	✓	30–120 sec
Axon Enterprise Inc., Axon Body 4	67	BT, Wi-Fi, LTE, GPS	NA	NA	120–160	1440	30	13+	128*	–	✓	30 sec–18 hrs.
Digital Ally, FirstVu Pro	67	Wi-Fi, LTE, 5G, GPS	3.35 x 2.2 x 1.1	5.8	110	1080	30	10+	128*	✓	✓	30 sec
Getac Video Solutions, BC-03	68	BT, Wi-Fi, LTE, GPS	3.3 x 2.9 x 0.8	6.4	165	1080	30	16	64*	–	✓	10–120 sec
iPro, BWC-4000	67	BT, Wi-Fi, GPS	3.4 x 2.8 x 0.9	6	157	1200	30	12	128*	–	✓	0–180 sec
Kustom Signals, Argus	64	BT, Wi-Fi, GPS, LTE	3.4 x 2.3 x 1.1	7.5	NA	1080	30	12	64	–	NA	NA
Kustom Signals, Eyewitness Vantage	64	BT, Wi-Fi, GPS	3.4 x 2.3 x 1.1	6	120	1080	30–60	17	32	–	✓	0–30 sec
LensLock, Eagle 13	67	BT, Wi-Fi, GPS, 5G	NA	NA	143	1080	NA	12	64*	–	NA	0–30 sec
LensLock, Genesis 12.5	67	BT, Wi-Fi, GPS	3.4 x 2.6 x 1.1	NA	140	1296	30–60	14	32–128*	–	NA	0–30 sec
Motorola Solutions, VB400	67	BT, Wi-Fi, GPS	3.5 x 2.7 x 1.0	5.7	140	1080	25–30	12	64*	–	✓	120 sec, continuous
Motorola Solutions, V300	67	BT, Wi-Fi, LTE, LMR, GPS	3.5 x 2.7 x 1.0	6.8	130	1080 p	5–30	12	128*	–	–	0–120 sec, continuous
Motorola Solutions, V700	67	BT, Wi-Fi, GPS, LTE	3.9 x 2.4 x 1.1	6.9	160	1080	30	12	128*	–	✓	0–600 sec, continuous

Manufacturer, Product	IP Rating	Connectivity Sources	Dimensions (in.) (h x w x d)	Weight (oz.)	Approximate Diagonal Field of View (degrees)	Maximum Video Resolution (p)	Video Frame Rate (fps)	Battery Runtime (hours)	Onboard Storage (GB)	Playback Display	Audio Mute Capability	Pre-event Buffer
Pro-Vision, Bodycam 4	68	BT	NA	NA	140	1296	30	14	64*	–	NA	Optional continuous
Reveal Media, D6 and D7	65	BT, Wi-Fi (LTE)	4.2 x 2.5 x 1.1	7.1	150	1080	25–30	12	64*	✓	✓	NA
Reveal Media, K6 and K7	65	BT, Wi-Fi (LTE)	4.5 x 2.5 x 1.1	7.8	150	1080	25–30	13	64*	✓	✓	NA
Safe Fleet, FOCUS X2	67	BT, Wi-Fi	3.4 x 2.6 x 1.1	6.8	120	1440	60	15	64	–	✓	0–199 sec
Sentinel Camera Systems, LLC, Protector II	67	BT, Wi-Fi, LTE, GPS	3.3 x 2.2 x 1.1	5.8	140	1440	30–60	15	32–256	✓	✓	30–60 sec
Utility Associates Inc., EOS	X2	BT, Wi-Fi, GPS, 5G LTE, LMR	6.2 x 3.0 x 0.3	6	140	1280	30	12	128*	✓	✓	0–120 sec
Visual Labs, Smartphone Body Camera Solution	Mobile-Device-Dependent											
WOLFCOM, Commander	68	BT, Wi-Fi, LTE, GPS	4.1 x 2.6 x 0.7	6	140	1080	30	15	32–128*	✓	NA	5–60 sec
WOLFCOM, Halo	67	Wi-Fi, GPS	NA	4.6	140	1080	NA	20	32*	✓	NA	30 sec–30 min

NA   Information not available at the time of publication.

*   Cloud storage is offered for data management. Subscriptions may be required.

3.1 Axon Enterprise, Inc., Axon Body 3 AX1023

The Axon Body 3 can be remotely activated via the Signal Vehicle and Signal Sidearm devices. The Signal Vehicle can integrate with various in-car relay sensors, including for lightbars, door sensors, brakes, g-force, speed, or acceleration. The specific activation signal is passed to the camera, allowing agencies to program detailed activation logic (e.g., if driver's door is opened, the camera activates *only* if the light bar is on). The Signal Sidearm can attach to most widely used holsters and be programmed to activate the body-worn camera whenever a sidearm is drawn. The Body 3 can also activate when in proximity to other recording cameras, via CAD activation, or without additional hardware, using a BLE signal when an Axon Taser weapon is armed or arced or the trigger is pulled.

Figure 3-1 Axon Body 3 AX1023

Image Credit: Axon Enterprise, Inc

The camera features a fixed focus, all-glass lens with FOVs of 125.2° horizontal, 68.6° vertical, and 146.4° diagonal. It has a lux rating that is better than 0.1 lux. The camera is capable of recording at resolutions up to 1080p and has 64 GB of onboard storage. The camera has an adjustable pre-record buffer of 30-120 seconds.

The camera does not have a video playback display but does have Bluetooth and Wi-Fi, which allow connection to the Axon View App on an Android or iOS device for video playback.

The camera can connect to Wi-Fi networks and GPS and source location data from both. The Body 3 has onboard LTE connectivity to support real-time location sharing, evidence offloading, and livestreaming capabilities. Wi-Fi can also be used to offload evidence directly to base station servers. The ability to connect to an agency's existing radio infrastructure is listed as a future capability.

The camera is powered by a rechargeable, replaceable, 3440 mAh battery, which has a life of 12+ hours.

The camera measures 3.8" x 2.6" x 1.2" and weighs 6.9 ounces. The operating and storage temperature ranges for the camera are both −4°F to 95°F (−20°C to 35°C). The camera has an IP rating of 67 and is tested to the U.S. Military Standard of MIL-STD-810G.

The camera uses non-removable storage, which is AES-XTS 128-bit encrypted. All data is signed and hashed, demonstrating authenticity, and preventing editing. The camera will only boot from Axon firmware. All actions on the device or taken on a piece of evidence are audited, and anti-malware software prevents intrusions.

A one-year warranty is included with each procurement. A five-year warranty with a hardware upgrade program is available for an additional cost. Axon provides access to its Axon Academy to provide user training. Axon can also provide cost proposals for additional training.

Pricing is available upon request from Axon Enterprise, Inc.

3.2 Axon Enterprise, Inc., Axon Body 4

The Axon Body 4 can be remotely activated via the Signal Vehicle and Signal Sidearm devices. The Signal Vehicle can integrate with various in-car relay sensors, including for lightbars, door sensors, brakes, g-force, speed, or acceleration. The specific activation signal is passed to the camera, allowing agencies to program detailed activation logic (e.g., if driver's door is opened, the camera activates *only* if the light bar is on). The Signal Sidearm can attach to most widely used holsters and be programmed to activate the body-worn camera whenever a sidearm is drawn. The Body 4 can also activate when in proximity to other recording cameras, via CAD activation, or without additional hardware, using a BLE signal when an Axon Taser weapon is armed or arced or the trigger is pulled.

The camera features a fixed focus, all-glass lens with an agency configurable 120° – 160° diagonal FOV. It has a lux rating that is better than 0.1 lux. The camera is capable of recording at resolutions up to 1440p. The camera includes 128 GB of onboard storage. The camera has an adjustable pre-record buffer of 30 seconds to 18 hours.

Figure 3-2 Axon Body 4 with point of view module

Image Credit: Axon Enterprise, Inc.

The Body 4 features a removable point-of-view (POV) camera that can be positioned by the user. When attached to the Body 4, the POV camera view replaces the main unit camera view. When the POV camera is detached, the recording switches back to the main unit camera. The POV camera has an IP67 rating.

The camera does not have a video playback display but does have Bluetooth and Wi-Fi, which allow connection to the Axon View App on an Android or iOS device for video playback.

The camera can connect to Wi-Fi networks and GPS and source location data from both. The Body 4 has onboard LTE connectivity to support real-time location sharing, evidence offloading, and livestreaming capabilities. Wi-Fi can also be used to offload evidence directly to base station servers.

The camera is powered by a rechargeable, 4300 mAh lithium-ion polymer battery, which has a life of 13+ hours, even while using livestreaming features.

The camera dimensions and weight were not available to report; contact Axon for more information. The operating and storage temperature ranges for the camera are both −4°F to 95°F (−20°C to 35°C). The camera has an IP rating of 67 and is tested to the U.S. Military Standard of MIL-STD-810G.

The camera uses non-removable storage, which is AES-XTS 256-bit encrypted. All data is signed and hashed, demonstrating authenticity, and preventing editing. The camera will only boot from Axon firmware. All actions on the device or taken on a piece of evidence are audited, and anti-malware software prevents intrusions.

A one-year warranty is included with each procurement. A five-year warranty with a hardware upgrade program is available for an additional cost. Axon provides access to its Axon Academy to provide user training. Axon can also provide cost proposals for additional training.

Pricing is available upon request from Axon Enterprise, Inc.

3.3 Digital Ally Inc., FirstVu Pro Body Camera

The FirstVu Pro pairs with Digital Ally's EVO-HD in-car video system. The systems can be programmed to automatically cross-trigger each other, which allows the FirstVu Pro to use the in-car activation sensors on the EVO-HD. These include emergency lights and sirens, vehicle speed, gun lock, trunk latch, doors, g-force/impact events, or any in-car switch wired to a FirstVu 12-volt relay box. Digital Ally also offers the VuLink II interface module, which enables similar functionality with other in-car cameras and trigger systems. Integration with Digital Ally's EVO Web Portal gives dispatch and supervisors near real-time geolocation and CAD activation. This system also features customizable geofence zones to automatically start recordings when a responder enters or leaves predefined areas.

Figure 3-3 FirstVu Pro Body Camera

Image Credit: Digital Ally Inc.

The FirstVu Pro Body Camera has a 2.4-inch capacitive, chemically strengthened glass, full-color touchscreen display with an on-screen camera control interface for adjusting settings and viewing recordings in the field. Video evidence can also play back to a smartphone with the VuVault Go app.

The camera features a 3.6 mm (~35 mm lens equivalent) fixed focus lens with a 110°FOV, adjustable recording resolution up to 1080p, and a 0.1 lux rating without using the camera's built-in IR illuminators. With the IR illuminators activated, the camera has a sensitivity approaching 0 lux and the ability to identify subjects at distances up to 5 meters. The camera offers motion blur reduction and noise reduction technologies. The FirstVu Pro also has a secondary, rear-facing camera that can be used for interior vehicle recording in conjunction with an optional windshield mount. The camera includes 128 GB of onboard storage. The camera has a 30 second pre-record buffer.

The camera has Wi-Fi, which it uses to connect to mobile devices running the VuVault Go app. It has an onboard GPS receiver as well as LTE and 5G connectivity that can be used to livestream a video feed from any camera. Users can remotely upload video evidence using the EVO Web Portal.

The camera is powered by a 10+ hour lithium-ion polymer battery that is hot-swappable, meaning the battery can be changed without interrupting a recording.

The camera measures 3.35" x 2.2" x 1.1" and weighs 5.8 ounces. The operating and storage temperatures for the camera are both −2°F to 131°F (−18°C to 55°C). The camera has an IP rating of 67 and is capable of being immersed in 3 feet of water for 30 minutes. The camera is tested to MIL-STD-810G for shock and vibration.

The FirstVu Pro features at-rest AES-256 encryption, built-in access controls to limit access to system settings, and MD5 hash verification of recordings. Verification of an evidentiary video file can run at any time from a customer-facing account.

Digital Ally responded to the RFI and provided rough order of magnitude pricing for the FirstVu Pro of between $49 and $79 per unit, per month, which is bundled with a five-year cloud services plan that includes an Advanced Exchange Warranty for the BWCs. If the hardware has a covered service issue, Digital Ally will ship a replacement module, which should arrive at most domestic agencies within two days. An Advanced Exchange Warranty is also included for the QuickVu Docking Station and other hardware for the duration of the EVO Web Portal GovCloud Contract with the Cloud Plans.

On-site training sessions are offered for an additional cost as part of a Professional Services Turn-Key Setup plan and can typically be completed in less than four hours.

3.4 Getac Video Solutions, Body Worn Camera BC-03

The BC-03 camera can automatically activate from any in-car sensor wired into the Getac TB-02 Bluetooth Trigger Box. The trigger box can be programmed to activate only one camera, a specific group of cameras, or all cameras in range. It can also be programmed to require multiple sensor activations to trigger a recording. Triggers include vehicle acceleration, vehicle speed, g-force, opening car door, opening a weapon lock, and proximity to recording devices. An optional LTE capability enables CAD activation of a recording, including geofencing and livestreaming capabilities. Getac also offers the BC-02, a similar camera without the integrated LTE connection.

Figure 3-4 Body Worn Camera BC-03

Image Credit: Getac Video Solutions

The BC-03 does not feature a display, but video playback and event tagging are possible on a connected smartphone. The camera also features a unique rotary "category wheel" on the front that can be used to instantly tag events in the field with one of 64 pre-defined labels.

The camera features a 165° diagonal FOV. Video and audio are both recorded in non-proprietary .mp4 formats. The video encoding technology is H.264 (capable of H.265 in some situations), and the audio encoding technology is Advanced Audio Coding (AAC). In addition to video, the camera can capture still images. The camera includes 64 GB of onboard storage. The camera has an adjustable pre-record buffer of 10-120 seconds.

The camera can connect to Wi-Fi networks and GPS. It can also connect to proprietary public safety cellular networks through an LTE radio. Video evidence can be off-loaded in real-time via LTE, or the camera can communicate via Wi-Fi with a Getac in-car video system to cache video for later upload when cellular service becomes available. Video and audio data files are stored via proprietary software. Only authorized users can access data, which is encrypted in transit.

The BC-03 is IP68 certified and tested to MIL-STD 810G. Chest mount, pocket mount, MOLLE mount, chest clip, and epaulette clip mounting options are available. The camera is powered by an internal non-removable lithium-ion battery as well as an optional removable battery that charges the internal battery. Adding one external battery enables up to 16 hours of operational use.

The camera measures 3.3" x 2.9" x 0.8" and weighs 6.4 ounces. The camera is rated for operation and storage temperatures of −40°F to 140°F (−40°C to 60°C). It is IP68 certified.

Getac provides a one-year standard limited warranty against defects in workmanship or materials under normal use for the BC-03 and has extended warranty plans available. Train-the-trainer type training is available for an additional cost and is typically completed in one to two days.

Pricing is available upon request from Getac Video Solutions.

3.5 i-Pro, Body-Worn Camera BWC4000

The BWC4000 can automatically activate via an optional Yardarm Holster Aware Bluetooth holster trigger signal (the camera supports two per officer for both a firearm and a conducted-energy weapon), activation of an i-Pro in-car video system (triggered manually or by activating the lightbar, siren, or crash sensor), or via a common trigger box mounted in a vehicle. The common trigger box can activate either or both systems via any 12V vehicle trigger (door opening, weapons lock, trunk release, etc.).

The BWC4000 has a status LCD display but does not have a video screen. Instead, the camera can be connected to a smartphone for video playback.

The camera features a tempered glass, fixed lens with FOVs of 137° horizontal and 79° vertical in the 16:9 aspect ratio mode and 115° horizontal and 87° vertical in the 4:3 mode. The camera has a 0.08 lux rating in both the color and black-and-white modes. The camera has 6-axis gyroscopic image stabilization. Video and audio

Figure 3-5 i-Pro BWC4000

Image Credit iPro

are recorded in the MPEG-4 Part 14 format. The video encoding technology is H.264, and the audio encoding technology is AAC. The camera features four microphones with advanced noise canceling technology. The camera also has a "Snapshot" feature to capture still images. The camera includes 128 GB of onboard storage. The camera has an adjustable pre-record buffer of 0-180 seconds.

The camera can connect to Bluetooth, Wi-Fi networks, and GPS. It cannot connect to an agency's existing radio infrastructure or cellular networks but is capable of livestreaming via Wi-Fi. The camera's networking capability is compliant with both Federal Information Processing Standards (FIPS) and CJIS.

The camera is powered by a removable, field swappable, lithium-ion battery with a standard run time of 12+ hours.

The camera measures 3.4" x 2.8" x 0.9" and weighs 6.0 ounces. The operating temperature range for the camera is −4°F to 122°F (−20°C to 50°C), and the storage temperature range for the camera is −4°F to 140°F (−20°C to 60°C). The camera has an IP rating of 67 and has been tested to MIL-STD-810H.

The BWC4000 is on the General Services Administration (GSA) Schedule and can be purchased at www.gsaadvantage.gov. The GSA price for the camera is $980 and includes a magnetic mounting stud. A three-year software license for a single BWC, which includes cloud evidence management, redaction, help desk support, and unlimited storage for video is available for $1,512. The purchase price includes a three-year warranty on the camera and a one-year warranty on the battery; various extended warranties and options are available for additional cost.

i-PRO provides detailed training for system administrators, command staff, and end users. For end users, training is typically done in a train the trainer format, but i-PRO will work with the client to present an acceptable solution. A typical end user training usually takes two hours per class.

3.6 Kustom Signals, Argus BWC

The Argus BWC features artificial intelligence (AI) triggering capabilities. Audio AI features include the recognition of common phrases to automatically trigger a recording. Argus comes with pre-recorded phrases that have been trained using AI, and agencies can submit phrases for Argus BWC to learn.

Argus BWC also has onboard sensor-based AI triggers, including running, hard falls, and gunshot detection. When LTE is enabled, AI-trained alerts can be sent to off-site personnel to allow them to livestream the triggered camera to assess the situation. No information was available regarding holster-draw activation or other Bluetooth triggers.

Argus BWC will be capable of integrating with the Argus in-car video system when it is launched; the system was in development at the time of this report. No details were available on how the Argus BWC will integrate with Argus in-car triggers.

Figure 3-6 Kustom Signals Argus
Image Credit Kustom Signals

The Argus BWC has a battery life of up to 12 hours while continuously recording. It has a hot swappable battery for up to 24 hours of continuous use. In power save mode, the device can remain charged for 96 hours. The Argus camera includes 64 GB of secure onboard storage and can record up to 12 hours of footage at 1080p/30 fps and up to 28 hours of footage at 720p/30fps. Information regarding a pre-event buffer on the Argus was not available.

The Argus BWC has NFC, Bluetooth, Wi-Fi, LTE, and a GPS receiver to support trigger functions, geolocation, and livestreaming of activated cameras.

The camera measures 3.4" x 2.3" x 1.1" and weighs 7.5 ounces. No information on the Argus' FOV and low light capabilities was available.

The Argus BWC has an IP rating of 64 and provides protection from dust and water. It is tested to MIL-STD-810G. No information was available on audio mute capabilities, but the Argus features AI-powered noise cancelation.

The recording media is non-removable, and file access requires a secure FTP Ethernet connection between the Vantage docking station and Kustom Signals' Eyewitness Data Vault/Eyewitness Data Vault Lite. MD5 hash is calculated for each file on the camera before transfer and is calculated again after transfer to compare against the original value. A match will allow the file to enter the database and be removed from the camera. Servers can be cloud-based or hosted locally by the purchasing agency.

No data on warranty, training, or support was available from the manufacturer.

Pricing is available upon request from Kustom Signals.

3.7 Kustom Signals, Eyewitness Vantage

The Eyewitness Vantage can be activated by the Yardarm Holster Aware when a firearm or conducted energy weapon is drawn. It also integrates with Kustom Signals' Eyewitness HD in-car video system, allowing for paired activation of the two systems. This allows the Eyewitness Vantage to trigger from the car's lightbar, sudden braking, or a car crash.

The camera features a 120° wide-angle lens and large control buttons. It offers low-light performance by switching between day and night mode. Optional IR illuminators enable video capture in complete darkness.

Figure 3-7 Kustom Signals Eyewitness Vantage

Image Credit: Kustom Signals

The Eyewitness Vantage has a Bluetooth, Wi-Fi, and GPS receiver to support trigger functions and geolocation, but it can transfer data only via vehicle- or station-based docking.

The camera measures 3.4" x 2.3" x 1.1" and weighs 6.0 ounces. The Kustom Signals Eyewitness Vantage has a battery life of up to nine hours when recording 480p SD video and up to eight hours recording 720p HD video. In power save mode, the device can remain charged for 96 hours. It can record video in the following combinations: 1080p/30 fps, 720p/60 fps, 720p/30 fps, and 480p/30 fps. It offers 32 GB of secure storage and can record up to six hours at 1080p or up to 17 hours at 480p. The camera includes 64 GB of onboard storage. The camera has an adjustable pre-record buffer of 10-30 seconds.

Other features include the ability to store coordinates with a bookmark to support geo-searches and to return to a specific event, which saves time during review. It has an IP rating of 64 and provides protection from dust and water. It is tested to MIL-STD-810G. The system also features an audio mute button if an officer needs to comply with privacy laws.

The recording media is non-removable, and file access requires a secure FTP Ethernet connection between the Vantage docking station and Kustom Signals' Eyewitness Data Vault/Eyewitness Data Vault Lite. MD5 hash is calculated for each file on the camera before transfer and is calculated again after transfer to compare against the original value. A match will allow the file to enter the database and be removed from the camera.

The Eyewitness Vantage comes with a one-year warranty. Optional additional purchases include a magnetic mount to use in lieu of the supplied spring-clip, a multi-dock that supports six cameras, file management software (e.g., Eyewitness Data Vault and Eyewitness Data Vault Lite), an extended no-fault warranty, and an in-car charging kit.

Pricing is available upon request from Kustom Signals.

3.8 LensLock, Eagle 13

The Eagle 13 allows agencies to select up to eight distinct Bluetooth triggers to automatically initiate a recording. Available triggers include opening a door, vehicle speed, in-car video recording, firearm draw, emergency lights and/or siren, gun rack release, non-lethal weapon deployment, and heavy braking or collision. The Eagle 13 includes wireless data offloading and live streaming via cellular. AI-powered triggers facilitate recording using voice commands, foot pursuit activation, and gunshot detection. The unit does not have a video display screen; field review and incident tagging can be accomplished via the LensLock Mobile smartphone app for units equipped with wireless connectivity. The unit has an LCD that displays camera status information such as battery level, recording status, camera ID, cellular/Wi-Fi connection status and signal strength, Bluetooth status, GPS connectivity, and memory storage level.

Figure 3-8 LensLock Eagle 13

Image Credit: LensLock

The Eagle 13 has a fixed, 143° wide angle lens and is capable of recording at various user-defined resolutions from 720p up to 1080p. The camera has 64GB of memory and is capable of recording up to 12 hours of continuous footage. The Eagle 13 has a hot-swappable battery with 12 hours of runtime. The camera has an adjustable pre-record buffer of 0-30 seconds. The Eagle 13 has an IP rating of 67. Information on the dimensions and weight of the Eagle 13 was not available.

Video is recorded in the .mp4 format with H.264 or H.265 video codec encoding. Video data is offloaded via LTE cellular connection or via docking/charging stations at the agency facility. LensLock provides the requisite number of 20-unit docking stations to match the number of cameras an agency has in use. All LensLock solutions use CJIS-compliant cloud storage provided by Microsoft Azure. LensLock provides a transition team for agencies that are using local storage to simplify migrating agency data to the cloud.

Warranty and training information was not available.

Pricing is available upon request from LensLock.

3.9 LensLock, Genesis 12.5

The Genesis 12.5 allows agencies to select up to eight distinct Bluetooth triggers to automatically initiate a recording. Available triggers include opening a door, vehicle speed, in-car video recording, firearm draw, emergency lights and/or siren, gun rack release, non-lethal weapon deployment, and heavy braking or collision.

Wi-Fi and Bluetooth are optional features of the Genesis 12.5, so agencies desiring automatic activation triggers should ensure that, at a minimum, they purchase Bluetooth-capable units. GPS is standard on the Genesis 12.5. The unit does not have a video display screen but does have an LCD status display screen.

Emergency responders can use the LensLock Mobile smartphone app for field review and incident tagging for camera units that are equipped with wireless connectivity.

Figure 3-9 LensLock Genesis 12.5

Image Credit: LensLock

The Genesis 12.5 has a fixed, 140° wide angle lens and is capable of recording at various user-defined resolutions up to 1296p. The camera is available in 32, 64, and 128 GB memory configurations, so maximum recording times are variable. In certain configurations, the camera is capable of recording 12+ hours of continuous footage. The Genesis 12.5 has a non-removable 4400 mAh lithium-ion battery with a run time of 14 hours while recording at 720p. The camera includes 64 GB of onboard storage by default. The camera has an adjustable pre-record buffer of up to 30 seconds.

Night vision is enhanced by two IR lights, which provide up to 10 meters of illumination with visible face detection. The Genesis 12.5 has an IP rating of 66.

The camera measures 3.4" x 2.6" x 1.1". The weight of the camera was not available.

Video is recorded in the .mp4 format with H.264 or H.265 video codec encoding. Video data is offloaded via docking/charging stations at the agency facility. LensLock provides the requisite number of 20-unit docking stations to match the number of cameras an agency has in use. All LensLock solutions use a CJIS-compliant cloud storage provided by Microsoft Azure. LensLock provides transition team agencies that are using local storage to simplify migrating agency data to the cloud.

Warranty and training information was not available.

Pricing is available upon request from LensLock.

3.10 Motorola Solutions, VB400 Body-Worn Camera

The VB400 features Record-After-the-Fact technology, which enables agencies to recover footage days later, even in the absence of manual or automatic recording initiation. This setting enables continuous recording until the video memory is full. Depending on the recording resolution, this recording can last up to 19½ hours. This is configurable by the agency, with the option to turn the feature off or to use traditional short duration pre-event buffers.

The VB400 works with the wireless Yardarm Holster Aware sensor and can be remotely triggered by the emergency button found on select Motorola radios. Originally designed for security applications, the VB400 does not integrate with in-car camera systems but does have a feature not found in the V700, Peer Assisted Activation. This feature allows a VB400 that has been activated to send a signal to other agency owned VB400 cameras in the area, triggering them to begin recording.

Figure 3-10 Motorola VB400

Image Credit: Motorola Solutions

The VB400 does not have a screen, so the user cannot review videos. Instead, the camera features Wi-Fi based livestreaming viewable via the Motorola VideoManager control center software for Microsoft Windows. On-camera recordings are AES 256 encrypted, using encryption keys specific to the control center base station. Recordings may also be offloaded from the camera via a hardware docking station.

The VB400 features a 120° horizontal, 65° vertical, and 140° diagonal FOV and can record at user selectable resolutions up to 1080p. With 64 GB of onboard storage, the VB400 can record up to 19½ hours of footage and will alert the user when the memory is full. The video is recorded in a non-proprietary MPEG format and encoded using H.264, with H.265 available in a future release. The camera's sensor is capable of recording in light levels as low as 0.2 lux. The camera has a pre-record buffer of 120 seconds or can be configured with the continuous Record-After-the-Fact buffer.

The battery in the VB400 is a non-removable, rechargeable lithium-polymer battery with an estimated 12-hour run time.

The camera measures 3.5" x 2.7" x 1.0" and weighs 5.7 ounces. The camera's operational and storage temperature ranges from −4°F to 122°F (−20°C to 50°C). The VB400 has an IP rating of 67 and is drop and shock tested to MIL-STD-810G.

The VB400 has an RFID feature built into the camera. For agencies that issue different cameras to responders each shift, this feature allows the camera to be easily associated to individual personnel at the beginning of a shift using a radio frequency scanner pad. The cameras can be checked back into the docking station at the end of a shift using the same procedure.

Motorola includes a one-year manufacturer warranty for both hardware and software. Extended warranties are offered for up to five years, in addition to bundled options for hardware and software.

Pricing is available upon request from Motorola Solutions. The Motorola VB400 is on the GSA Schedule and can be purchased on the GSA Advantage website at www.gsaadvantage.gov.

3.11 Motorola Solutions, V300 Body-Worn Camera

The V300 is capable of Record-After-the-Fact, which allows for continuous recording for 12+ hours, and recovering event information even if the camera was not triggered. Affirmative recording triggers include the aftermarket Yardarm Holster Aware sensor that initiates recording when a firearm or conducted-energy weapon is drawn, wireless activation when the emergency button on a Motorola APX portable radio is pressed, or bidirectional recording activation when a Motorola in-car video system is paired to the V300. In-car triggers include the activation of lights, sirens, door locks, weapons locks, crash, speed, or other auxiliary 12-volt triggers.

The V300 has a status LCD but does not have a video screen. Instead, the camera can connect to the Motorola SmartControl app, available on iOS or Android smartphones, to view and classify content.

Figure 3-11 Motorola V300

Image Credit: Motorola Solutions

The camera measures 3.5" x 2.7" x 1.0" and weighs 6.8 ounces. The V300 features a 130° horizontal and 73° (adjustable up 15° or down 20°) vertical FOV and can record at user selectable resolutions up to 1080p. With 128 GB of onboard storage, the V300 can record up to 23 hours of footage at 1080p. The camera's 4k sensor is capable of recording in light levels as low as 0.035 lux.

Video is recorded in a non-proprietary MPEG format and encoded using H.264 High Profile to reduce recording sizes. The camera has two audiophile quality microphones, which include foam baffles to block wind noise. The audio is encoded with AAC. The V300 lacks an audio mute capability.

The adjustable pre-event buffer is 0-120 seconds or can be configured with the continuous Record-After-the-Fact feature.

The V300 has Bluetooth, Wi-Fi, and onboard GPS. Recordings can be offloaded at a station-based hardware dock or a physical dock linked to a Motorola in-car video system, and then sent to agency storage if the vehicle has Wi-Fi or LTE-cellular connectivity. The camera has a lithium polymer rechargeable battery with an estimated 12-hour run time that is field-swappable for extended shift work.

The camera's operational and storage temperature range is from −4°F to 140°F (−20°C to 60°C). The V300 has an IP rating of 67 and is drop and shock tested to MIL-STD-810G.

The V300 uses Federal Information Processing Standards (FIPS)-140-2 compliant, AES 256-bit encryption for both at-rest and in-transit data. Motorola offers various storage solutions, including on-premises, cloud services, or a storage hybrid of on-premises and cloud.

The V300 is manufactured in the United States, and Motorola includes a one-year manufacturer warranty for both hardware and software. Extended warranties are offered for up to five years, in addition to bundled options for hardware and software. Pricing is available upon request from Motorola Solutions. The V300 is on GSA schedule and can be purchased on the GSA Advantage website at www.gsaadvantage.gov.

3.12 Motorola Solutions, V700 Body Worn Camera

The Motorola V700 features LTE connectivity, which enables live streaming of the BWC video camera feed via Motorola's Command Central software. Livestreaming can be triggered by officers in the field by activating the emergency button on the camera, supplying situational awareness information to dispatchers, supervisors, and responding officers. The V700 is also capable of Record-After-the-Fact, which allows the BWC to cache 110 hours of video at 480p resolution and recover cached event information (video with agency optional audio) even if the camera was not triggered.

Affirmative recording triggers include the Yardarm Holster Aware sensor that initiates recording when a firearm or conducted-energy weapon is drawn, wireless activation when the emergency button is pressed or fall detection is activated on a Motorola APX portable radio, or bidirectional recording activation when a Motorola M500 in-car video system is paired to the V700. In-car triggers include activation of lights, sirens, door locks, weapons locks, crash, speed, or other auxiliary 12-volt triggers.

Figure 3-12 Motorola V700

Image Credit: Motorola Solutions

The V700 has a status LCD but does not have a video screen. The camera can connect to the Motorola SmartControl app, available on iOS or Android smartphones, to view and classify content.

The V700 features a 130° horizontal and 73° FOV and can record at user selectable resolutions up to 1080p. With 128 GB of onboard storage, the V700 can record up to 28 hours of footage at 1080p. The camera's 1080p sensor is capable of recording in light levels of less than 0.1 lux. The camera has an adjustable pre-record buffer of 0-600 seconds or can be configured with Motorola's continuous Record-After-the-Fact buffer.

Video is recorded in a non-proprietary MPEG format and encoded using H.264 High Profile to reduce recording sizes. The camera has two audiophile quality microphones, which include foam baffles to block wind noise. The V700 has an audio mute capability.

The V700 has NFC, Bluetooth, Wi-Fi, LTE, and onboard GPS. Recordings can be uploaded to servers via the BWC's LTE or via a physical dock linked to a Motorola in-car video system and then to agency storage if the vehicle has LTE-cellular connectivity or can be offloaded at a station-based hardware dock. The camera has a 12-hour lithium polymer rechargeable battery that is field-swappable for extended shift work.

The camera measures 3.9" x 2.4" x 1.1" and weighs 6.9 ounces. The camera's operational temperature range is from −4°F to 140°F (−20°C to 60°C) and the storage range is −40°F to 185°F (−40°C to 85°C). The V700 has an IP rating of IP67 and is drop and shock tested to MIL-STD-810G.

The V700 uses Federal Information Processing Standards (FIPS)-140-2 compliant, AES 256-bit encryption for both at-rest and in-transit data. Motorola offers various storage solutions, including on-premises, cloud services, or a storage hybrid of on-premises and cloud.

Motorola includes a one-year manufacturer warranty for both hardware and software. Extended warranties are offered up to five years, in addition to bundled options for hardware and software.

Pricing is available upon request from Motorola Solutions.

3.13 Pro-Vision, Bodycam 4

The Bodycam 4 can be activated by the presence of another responder vehicle within 30 feet (via an in-car beacon or in-car camera system) or by the presence of another Pro-Vision Bodycam 4 actively recording within 30 feet. The Bodycam 4 also has an optional full-shift continuous recording capability to ensure that critical events are captured even if a recording is not manually or automatically triggered.

The Bodycam 4 has Bluetooth connectivity and offers an optional RFID capability, typically used to automate the camera inventory and check-out/check-in processes.

The Bodycam 4 has a fixed lens with a 140° FOV and a capability to record at resolutions up to 1296p. The system has Electronic Image Stabilization technology, designed to reduce erratic movement in recordings, providing clearer video in foot chases and other dynamic situations. Video is recorded in the .mp4 format and is stored with H.265 compression using AES-256 encryption. The camera has 64 GB of non-removable storage. The camera has an optional continuous pre-record buffer.

Figure 3-13 Pro-Vision Bodycam 4

Image Credit: Pro-Vision

The camera dimensions and weight were not available. The Bodycam 4 is rated for all climates and has an IP rating of 68. The battery is capable of up to 14 hours of continuous operation under optimal settings and conditions.

Video offloading is accomplished via single-camera docking stations in-vehicle or 10-camera docking stations at the agency's facility. Uploads are managed via the SecuraMax evidence management software, a CJIS-compliant local or cloud solution that maintains data "fingerprints" to ensure evidence integrity. SecuraMax can also manage in-car and evidence room video in the same manner.

Pro-Vision provides a one-year limited warranty on the Bodycam 4 for product defects, and a 90-day warranty on the Bodycam 4 battery. Pro-Vision offers online video training for users. Information on in-person training support was not available.

Pricing is available upon request from Pro-Vision.

3.14 Reveal Media, D6 and D7

The Reveal Media D6 and D7 are nearly identical units; the only difference is that the D& offers LTE cellular connectivity and the D67 does not. Both devices can be remotely activated via third-party Bluetooth sensors installed by an agency. Examples include activation when an officer leaves the vehicle or draws a sidearm from its holster.

Both the D6 and D7 feature a full-color front-facing screen to maximize transparency with the public. The screen also can be used for video playback.

The D6 and D7 each have an attached, articulated camera head to allow for various placements, including head mounting. They can also be used in a vehicle, as an interview recorder, or as a handheld camera. It offers a one-touch-record button.

The cameras have configurable, 90°–120° horizontal and 50°–60° vertical FOV. The D6 and D7 have a lithium-ion polymer battery (3940 mAh) with a battery life of 10 hours when recording video at 1080p with the screen on, 12 hours when recording video at 720p with the screen on, or 15 hours when recording video at 480p with the screen off. The D6 and D7 have a 2-inch color LCD with a plastic cover. The cameras have a memory capacity of 64 GB, which can store up to 20 hours of 1080p HD video or more than 68 hours at 480p. They store video in the MP4 format, have H.264 video encoding, and use AES 256 encryption. Both the D6 and D7 have a low light lux rating of 0.05 when recording at 30 fps. Reveal indicates that the D6 and D7 have a pre-event buffer, but no information was available regarding its duration or configuration.

Both the D6 and D7 can livestream through a Wi-Fi network or via a mobile device connected to a cellular network. The D7 can livestream directly via an LTE data connection. The devices have built-in GPS receivers and annotate location data to recordings.

Both cameras measure 4.2" x 2.5" x 1.1" and weigh 7.1 ounces. The D6 and D7 have an IP rating of 65, and a waterproof USB port. They have a ruggedized case, temperature ratings of −4°F to 122°F (−20°C to 50°C) for storage and operation, and ranges of 50°F to 86°F (10°C to 30°C) for charging.

Additional features for the D6 and D7 include the DEMS 360 evidence management system, which offers automated redaction, in-field annotation, and case support folders. Reveal Media DEMS 360 is compliant with FBI CJIS security policy. Reveal Media supplies a range of mounts for different user environments, uniforms, body types, or personal preferences (e.g., shoulder and magnet mounts, shirt clips, harnesses, and helmet mounts). Docking stations are also offered, which provide automatic video upload and battery charging.

The Hardware Warranty and Extended Warranty plan for Reveal products assures coverage for 12 months from the delivery date, including software support and maintenance. The Reveal Warranty is provided at no cost for the first year. For subsequent years, there is a fee of $41 for basic coverage, $73 for enhanced coverage, and $104 for premium coverage, which includes battery replacement. The plans cover damage resulting from normal operational use. Customers have the option to purchase annual extensions to ensure continuous coverage beyond the initial 12-month period. Reveal offers onsite or virtual train-the-trainer courses that are included with the purchase.

Pricing is available upon request from Reveal Media.

3.15 Reveal Media K6 and K7

The Reveal Media K6 and K7 are nearly identical units; the only difference is that the K7 offers LTE cellular connectivity and the K6 does not. Both devices can be remotely activated via third-party Bluetooth sensors installed by an agency. Examples include activation when an officer leaves the vehicle or draws a sidearm from its holster. The Reveal K- series introduces AI enabled triggers, using real time facial recognition that compares passive camera footage against server-based photographs of suspects, missing persons, or at-risk victims. Matches can automatically trigger a recording on the body-worn camera, alert the user, and transmit the database photograph to the device.

The devices feature a full-color front-facing touchscreen to maximize transparency with the public. The screen can also be used for video playback and control of most camera functions.

Both the K6 and K7 have an attached, articulated camera head to allow for various deployment options, including head mounting. They can also be used in a vehicle, as an interview recorder, or as handheld cameras. They offer a one-touch-record button.

The devices have configurable, 90°–120° horizontal and 50°–60° vertical FOV. They have lithium-ion polymer batteries (4500 mAh) with a battery life of 11-hours when recording video at 1080p, 12-hours when recording video at 720p, or 13-hours when recording video at 480p. The screens are 2.83-inch color LCD touchscreens with a dimmable backlight. They have a memory capacity of 64 GB, which can store up to 20 hours of 1080p HD video or more than 68 hours at 480p. The K6 and K7 store video in the MPEG-4 format, have H.264 and H.256 video encoding, and use AES 256 encryption. The K6 and K7 have a low light lux rating of 0.05 when recording at 30 fps. Reveal indicates that the K6 and K7 have a pre-event buffer, but no information was available regarding its duration or configuration.

The K6 (K7) can livestream through a Wi-Fi network or via a mobile device connected to a cellular network. The K7 can livestream directly via an onboard LTE data connection. Both versions of the device have built-in GPS receivers and annotate location data to recordings.

The cameras measure 4.5" x 2.5" x 1.1" and weigh 7.8 ounces. Both the K6 and K7 have an IP rating of 65, and a waterproof USB port. They have ruggedized cases, a temperature rating of 14°F to 113°F (−10°C to 45°C) for storage and operation, and a temperature range of 50°F to 86°F (10°C to 30°C) for charging.

Additional features include the DEMS 360 evidence management system, which offers automated redaction, in-field annotation, facial recognition management, and case support folders. Reveal is compliant with FBI CJIS security policy. Reveal Media supplies a range of mounts for different user environments, uniforms, body types, or personal preferences (e.g., shoulder and magnet mounts, shirt clips, harnesses, and helmet mounts). Docking stations are also offered, which provide automatic video upload and battery charging.

The Hardware Warranty and Extended Warranty plan for Reveal products assures coverage for 12 months from the delivery date, including software support and maintenance. The Reveal Warranty is provided at no cost for the first year. For subsequent years, there is a fee of $41 for basic coverage, $73 for enhanced coverage, and $104 for premium coverage, which includes battery replacement. The plans cover damage resulting from normal operational use. Customers have the option to purchase annual extensions to ensure continuous coverage beyond the initial 12-month period. Reveal offers onsite or virtual train-the-trainer courses that are included with the purchase.

Pricing is available upon request from Reveal Media.

3.16 Safe Fleet, FOCUS X2

The FOCUS X2 integrates with Safe Fleet's FOCUS H1 in-car video system. It can automatically activate via any sensor that triggers the H1, such as activating the light bar, opening the car door, or other in-car sensors. The X2 integrates with the H1 in-car video system for Wi-Fi upload, audio pairing, and case management. The X2 also has an accelerometer trigger function.

The camera has a 120° horizontal FOV and a 0.1 lux rating without artificial IR lighting. An optional "clip-cam" with an 87° FOV and 0 lux rating can be hardwired to the FOCUS X2 and mounted on a responder's uniform for optimal positioning. Video and audio are recorded in standard MPEG-4 and AAC formats, respectively. In addition to video, the camera can capture still images. The camera includes 64 GB of onboard storage. The camera has an adjustable pre-record buffer of up to 199 seconds.

Figure 3-14 FOCUS X2

Image Credit: Safe Fleet

The camera does not have a video playback display. It is Wi-Fi enabled, which allows it to connect to the FOCUS Mobile App on either an Android or iOS device for video playback. Wi-Fi can also be used to offload video evidence directly to base-station servers or to the Safe Fleet in-car system, which can then upload the data to cloud storage via a cellular link. The camera has a GPS capability, enabling it to log location data.

The camera is powered by a non-removable, 4500 mAh rechargeable lithium-ion battery capable of 15 hours of operation. When placed in a dock, the system can be charged via integrated spring-loaded pins while uploading camera recordings to back-office systems or cloud storage.

The camera measures 3.4" x 2.6" x 1.1" and weighs 6.8 ounces. The operating temperature range for the camera is from −4°F to 131°F (−20°C to 55°C). The camera has an IP rating of 67 and has been tested to MIL-STD-810G.

Wi-Fi is encrypted using WPA-Enterprise, WPA2 security. Cloud services use X.509 certificate-based authentication to grant access. Video and audio data files are protected with AES-256 encryption.

Available accessories include a magnetic mount, single- and eight-bay office docks (for charging and data transfer), vehicle docks, and the clip-cam accessory camera.

Administrative and user training is available for an additional cost or as part of various setup packages. Safe Fleet provides a one-year warranty against manufacturing defects for the FOCUS X2.

Pricing is available upon request from Safe Fleet.

3.17 Sentinel Camera Systems, LLC, Protector II Body Worn Camera

The Protector II is an LTE-connected camera capable of remote recording initiation by dispatch personnel or by motion-activated triggers. While livestreaming, the camera is also capable of two-way communication with dispatch without the need for a mobile phone interface. The motion-activation feature, when set up, will initiate a recording upon any motion detected within the camera's FOV, which may include the motion of the officer wearing the unit.

The Protector II has a 2″ color LCD screen with a plastic cover that allows for instant playback of video recordings. The camera also features an "audio-only" mode that allows its use as a voice recorder for report notes or witness interviews where video footage is not required.

Figure 3-15 Sentinel Protector II

Image Credit: Sentinel Camera Systems, LLC

The camera has a 140° FOV and two IR illuminators that are activated in the unit's Night Vision mode. The camera is capable of visible face detection at up to 10 m in low light conditions. The Protector II has a non-removable, 3200 mAh lithium-polymer, rechargeable battery capable of 15 hours recording time at 480p, 12 hours while using GPS and Wi-Fi, and 7½ hours of continuous livestreaming. The camera has a maximum recording resolution of 1440p and a maximum streaming resolution of 720p. Video is recorded in .mp4 format with H.264 and H.265 video encoding and MD5 video file hashing for evidence integrity verification. Data is encrypted on the device using AES 256-bit security. The camera comes standard with 64 GB of memory, but up to 256 GB of memory can be added as a factory-installed option at the time of purchase. The camera has an adjustable pre-record buffer of 30–60 seconds.

The Protector II has Bluetooth, LTE, Wi-Fi, and onboard GPS. Video recordings can be offloaded via a USB docking station or via Wi-Fi. With cellular services enabled, the Protector II can operate as an officer-to-dispatch or clustered camera-to-camera push-to-talk system. The system also features an SOS button that will send an alert with embedded GPS information to the dispatch center.

The camera measures 3.3" x 2.2" x 1.1" and weighs 5.8 ounces. The Protector II has an IP rating of 67 and is shockproof when dropped from a height of 1.8 m (5.9 ft).

All software required to manage the storage of video evidence is included with the purchase of the camera. Sentinel does not offer cloud services, but the included software is capable of interfacing with cloud storage services purchases separately by the agency. Agencies also have the option of using on-site, local servers for data storage.

The Sentinel Protector II has an MSRP of $700 per camera, including all software to operate the camera system. Software is available for storage management on user servers. Quantity discounts are available. Cloud storage is not available from Sentinel. Sentinel provides a one-year warranty on the camera and a 90-day warranty on accessories. Training is not included but is available at an additional cost.

3.18 Utility Associates Inc., EOS by Utility

The EOS can activate remotely via CAD, when activating emergency lights, via g-force sensors, when opening a vehicle door, when unholstering a firearm (via an externally mounted holster sensor), removing a long-weapon from a mount, when a gunshot is detected, or via onboard sensors that detect events such as a foot pursuit or an officer down (prone for a pre-defined period). It can also activate if an officer enters or exits a pre-defined geographical area or action zone. All triggers are policy-based, allowing the department full control over when their cameras should start and stop recording.

In addition to clip-on mounts, the EOS offers a system of magnet-and-pin portal mounts sewn into uniform shirts, traffic vests, and body armor carriers.

Figure 3-16 EOS by Utility

Image Credit: Utility Associates Inc.

This modified duty clothing is available in several styles and from multiple manufacturers. With these carriers, the camera is secured in a zippered pouch inside the clothing.

The camera includes 128 GB of onboard storage. The EOS supports pre- and post-event recording that captures video before activation or after deactivation. Configurable from 0 to 120 seconds, the camera offers customizable video buffer settings based on individual recording triggers.

The EOS uses a commercial off-the-shelf smartphone that features a 6.2-inch high-definition touch-screen display. The display can be used in landscape and portrait orientations, is full color, and allows for video playback. The touchscreen features a water-repellent design. Utility also offers a wristband mounted BT controller for the system so users can quickly activate the camera and control features without handling the camera.

The EOS can record at user-adjustable resolutions up to 1280p. Various lens attachments are available, providing various FOVs from 90° to 140°. It has a lux rating of 0.1 lux. The EOS records all videos into an open, non-proprietary format, using the H.264/MPEG-4 Part 10 compression standard. The video is wrapped into .mp4 envelopes. In addition to video, the camera can capture still images.

The camera can connect to Bluetooth, Wi-Fi, LTE, 5G, LMR, and GPS. Through FirstNet and AT&T Band 14 connectivity, the camera can also connect to Utility's interoperable in-car system. To protect data from accidental loss, Utility endeavors to have video offloaded from the body-worn camera to their AvailCloud as soon as practical, using the best available connection. Utility Associates Inc. offers Smart Waypoints, ruggedized Wi-Fi hotspots with storage that can be installed at the home-station or other strategic locations. These Smart Waypoints download and store video data from BWCs until it can be uploaded via ethernet or cellular connections.

The camera measures 6.2" x 3.0" x 0.3" and weighs 6.0 ounces. The camera is powered by a non-removable, rechargeable battery, which has a life of 12 hours when recording continuously and multiple days when in standby mode. The system has an IP rating of X2.

Utility responded to the RFI and provided comprehensive pricing data. For a BWC-only purchase, the subscription price is $105/month based upon a five-year contract. This includes one EOS camera, a holster sensor, AvailWeb training, unlimited storage, installation, 24/7 tech support, a vehicle USB charger, a wall USB charger, a camera holster and lens, and a warranty for the duration of the SaaS subscription. All EOS camera customers receive a $200 allotment toward any combination of new EOS-ready uniforms per user and five retrofits of existing uniforms within 90 days of contract execution.

Train-the-trainer training is included in the purchase price and offered in person and on site, and typically takes four hours to complete. Technical support staff will receive their own in-person training session that will cover troubleshooting, backend system navigation and redaction, reporting and reviewing activity logs, and producing scheduled reports.

3.19 Visual Labs, Smartphone Body Camera Solution

The Smartphone Body Camera Solution (SBCS) includes no physical camera hardware. The Visual Labs product is a software application for Android smartphones that turns the devices into full-function smartphone BWCs. When the Visual Labs application is installed on an Android smartphone, the product becomes a CJIS-compliant body-worn camera solution, while retaining all the allowed functionality of the smartphone itself. The Visual Labs solution also includes functionality as a digital camera, audio recorder, and personnel locator.

Figure 3-17 Typical Visual Labs mounting solution

Image Credit: Visual Labs

The SBCS offers integrated automatic recording triggers including geofencing, CAD activation, speed, proximity to other recording BWCs, and remote activation by authorized users. Visual Labs also offers a similar smartphone-based dash camera solution that, if installed, enables cross-activation including emergency lights or manual activation of the in-car camera. With third-party sensors, the camera may be triggered by drawing a firearm or conducted-energy weapon, mountable Bluetooth remote buttons, or officer injury. The Automatic Injury Detection by Select Engineering Services, LLC, uses a pair of panels in the front and back of a body armor carrier to detect penetration and send a Bluetooth signal to the connected smartphone. The Visual Labs application relays the event along with GPS and other data (which can include smart-watch heartrate feeds) to dispatch personnel. Memory specifications differ according to the smartphone utilized. The system has an adjustable pre-record buffer of 30, 60, or 120 seconds.

The camera's performance and specifications are dependent upon the Android smartphone selected for use. Various mounting solutions for law enforcement uniforms and car dashes are available from third-party suppliers. The system uses the native cellular and Wi-Fi capabilities of the smartphone to transfer data, so no docking stations or accessories (except for a mounting solution) are required.

Body-worn camera footage can be uploaded directly from the field and viewed by authorized personnel within minutes of an incident. The solution includes officer safety features, such as the ability to remotely activate a live video/audio stream from the smartphone for viewing by authorized supervisory personnel. A two-way video/audio stream can also be initiated. An officer's location can be transmitted to provide real-time positional awareness along with real-time situational awareness.

The application is FirstNet certified and CJIS compliant. All footage is maintained in the Microsoft Azure Government Cloud following strict security guidelines, including digital fingerprinting and encryption in transit and at rest. The video is recorded in .mp4 format with H.264 encoding. Audio is encoded as .m4a. The application uses AES 256 encryption, and data is verified using SHA-256 hash algorithms.

Training and cloud-based data storage are included with the Visual Labs Smartphone Body Camera solution subscription price of $50 per user/month for non-AT&T FirstNet users. The product is also available on the GSA schedule as a component of the AT&T/FirstNet contract.

3.20 WOLFCOM Commander

The Commander body-worn camera can automatically trigger via a Bluetooth sensor mounted to either a firearm holster or a conducted-energy weapon holster. With integrated LTE connectivity, the Commander is both video and audio livestream capable. The camera includes a light that indicates recording status, a laser pointer for aiming the camera when mounting it to the uniform, an integrated flashlight, facial recognition with alerts, and integration into the Android/Tactical Assault Kit software ecosystem. The unit also has an SOS mode activated by a dedicated button that sends GPS coordinates and a video live stream from the camera to dispatch and activates emergency identification lights on the unit that flash red and blue.

Figure 3-18 WOLFCOM Commander

Image Credit: WOLFCOM

The unit's LTE connectivity and integrated GPS receiver enable the Commander to function as a push-to-talk radio and GPS tracker and to send and receive text messages. The Commander also has integrated Wi-Fi. Dispatch personnel can view live footage from the WOLFCOM Commander.

The Commander has a 140° wide-angle lens. The camera is capable of recording at resolutions up to 1080p. The camera has a color touchscreen display on the back that can be used for video review and incident tagging. The system features a night vision capability that uses IR LEDs to enhance low-light recording. Night vision is configurable and can be turned on or off according to departmental policies. The standard camera includes 32 GB of memory but 64 GB and 128 GB variants are also available. WOLFCOM indicates that the Commander has a pre-event buffer that can be configured for 5–60 seconds.

The camera measures 4.1" x 2.6" x 0.7" and weighs 6.0 ounces. The camera has up to a 15-hour battery life, depending upon the settings and features used. The 3200 mAh lithium battery is field replaceable. The unit has an IP rating of 68. The operating temperature range is −4°F to 122°F (−20°C to 50°C).

Video data is recorded in .mp4 format. Files are verified for evidentiary integrity using the SHA-256 hash algorithm.

Data can upload to either on-site storage servers or to WOLFCOM Cloud Services via the WOLFCOM Evidence Management System. The camera charges and uploads data when it is physically docked at the agency's station. Agencies using the WOLFCOM Commander Online Platform System and a Live Streaming Connection Plan can also record livestreams to computers.

Purchase includes a one-year warranty against defects in materials or workmanship. The warranty only covers the WOLFCOM Commander, battery packs, docking ports, and docking stations. It does not cover the car mount, mounting clips, USB cables, power adapters, or other accessories. Pricing is available upon request from WOLFCOM.

3.21 WOLFCOM Halo

The Halo body-worn camera can automatically trigger via an optional sensor (available separately) mounted to a firearm holster. The unit will soon support facial recognition with alerts when integrated with the WOLFCOM facial recognition app on a Wi-Fi connected Android smartphone. The camera can connect with an Android smartphone to review video and tag incidents.

The Halo has a 140° fixed wide-angle lens. The camera is capable of recording at resolutions up to 1080p. The system features a night vision capability that uses IR LEDs to enhance low-light recording. Night vision is configurable and can be turned on or off according to departmental policies. The camera has 32 GB memory. The unit has a configurable pre-event buffer of 30 seconds to 30 minutes.

Figure 3-19 WOLFCOM Halo,
Image Credit: WOLFCOM

The camera weighs 4.6 ounces. The camera dimensions were not available. The battery life ranges from 11 hours to 20 hours, depending upon the settings and features used. The unit has an IP rating of 67. The operating temperature range was not available. An integrated GPS receiver enables the Halo to log location data. A button on the camera allows officers to geo-mark locations during a recording, such as the location of drugs or weapons thrown by suspects during a pursuit. Video data is recorded in .mp4 format. Files are verified for evidentiary integrity using the SHA-256 hash algorithm. Files are secured using AES encryption.

Data can be uploaded to either on-site storage servers or to WOLFCOM Cloud Services via the WOLFCOM Evidence Management System. The camera charges and uploads data when it is physically docked at the agency's station.

Purchase includes a one-year warranty against defects in materials or workmanship. The warranty only covers the WOLFCOM Halo, battery packs, docking ports, and docking stations. It does not cover the car mount, mounting clips, USB cables, power adapters, or other accessories. Pricing is available upon request from WOLFCOM.

4.0 VENDOR CONTACT INFORMATION

Additional information on the body-worn cameras included in this market survey report can be obtained from the manufacturers listed in Table 4-1.

Table 4-1 Manufacturer Contact Information

Manufacturer	Address	E-mail or Web Form	Website
Axon Enterprise, Inc.	17800 N. 85th Street Scottsdale, AZ 85255	contracts@axon.com	www.axon.com
Digital Ally Inc.	15612 College Boulevard Lenexa, KS 66219	bids@digitalallyinc.com	www.digitalallyinc.com
Getac Video Solutions	3600 American Boulevard W. Suite 500 Bloomington, MN 55431	sales@getacvideo.com	www.getacvideo.com
Kustom Signals	9625 Loiret Boulevard Lenexa, KS 66219	cs@kustomsignals.com	www.kustomsignals.com
LensLock	13125 Danielson Street Suite 112 Poway, CA 92064	www.lenslock.com/contact	www.lenslock.com
Motorola Solutions	809 Pinnacle Drive Suite G Linthicum Heights, MD 21090	www.motorolasolutions.com/en_us/video-security-access-control/demo.html#form	www.motorolasolutions.com/en_us/video-security-access-control/body-worn-cameras.html
Panasonic i-Pro	1701 Golf Road Suite 3-1200 Rolling Meadows, IL 60008	i-pro.com/products_and_solutions/en/publicsafety/contact-us	i-pro.com/us/en/
Pro-Vision	8625-B Byron Commerce Drive S.W. Byron Center, MI 49315	pr@provisionusa.com	provisionusa.com

Manufacturer	Address	E-mail or Web Form	Website
Reveal Media	13420 Reese Boulevard W. Suite 13 Huntersville, NC 28078	sales@revealmedia.com	www.revealmedia.com
Safe Fleet	6800 East 163rd Street Belton, MO 64012	info@safefleet.net sfle-sales@safefleet.net	www.safefleet.net/products/fleet-video-systems/law-enforcement-video-evidence-systems/focus-x2-body-camera/
Sentinel Camera Systems, LLC	PO Box 1219 Huntingdon Valley, PA 19006	info@sentinelcamerasystems.com	www.sentinelcamerasystems.com/products/protectorii/
Utility Associates, Inc.	250 E. Ponce De Leon Avenue Suite 700 Decatur, GA 30030	info@utility.com	www.bodyworn.com
Visual Labs	607 Menlo Avenue Menlo Park, CA 94025	team@visuallabsinc.com	www.visuallabsinc.com
WOLFCOM	1700 Lincoln Avenue Pasadena, CA 91103	contact@wolfcomglobal.com	wolfcomusa.com/commander-police-body-camera/

5.0   CONCLUSION

Emergency responders use body-worn cameras while on duty to record their actions and interactions with fellow responders and the public. These cameras can be used by all responder disciplines to ensure transparency, preserve evidence, monitor personnel, document interactions, increase the accuracy of written reports, provide a training tool for professional development, and improve standard operational procedures. Cameras may also deter aggressive behavior.

This market survey report provides information on 21 BWCs from 14 different manufacturers designed to be worn on a responder uniform that feature the ability to automatically activate via onboard or remote sensors. These cameras vary in form factor, size, weight, features, and activation methods. The automatic activation methods available can be broken down into three categories: vehicle-linked triggers; weapon-activated triggers; and remote activation by other cameras, CAD or geofencing. Of the 21 cameras reviewed, 16 can be automatically activated by vehicle-associated triggers, 15 can be automatically activated by unholstering or arming a weapon, and 15 can be automatically activated by other cameras, CAD, or geofencing.

Emergency responder agencies should consider overall capabilities and limitations of BWCs in relation to their agency's operational needs when making procurement or acquisition decisions.

6.0 APPENDIX A

This section provides information on the levels of ingress protection as specified by the two-digit designations in the IEC 60529 standard [4]. Table A-1 provides levels of solid ingress protection (first digit of IP code). Table A-2 provides levels of liquid ingress protection (second digit of IP code).

Appendix Table A-1 Levels of Solid Ingress Protection per First Digit of IP Code

Digit	Object Size Effective Against	General Description
0	No Protection	No protection against contact and ingress of solids
1	> 50 mm	Large surfaces, e.g., back of hand, but no protection against deliberate contact with body part
2	> 12.5 mm	Prevents entry of fingers and similarly sized objects
3	> 2.5 mm	Prevents entry of tools, thick wires, etc.
4	> 1 mm	Prevents entry of most wires, screws, large ants, etc.
5	Dust Protected	Dust ingress not entirely prevented but does not enter in sufficient quantity to interfere with satisfactory operation of equipment
6	Dust Tight	No ingress of dust

Appendix Table A-2 Levels of Liquid Ingress Protection per Second Digit of IP Code

Digit	Water Exposure Protection	General Description
0	No Protection	No protection
1	Vertically dripping water	Vertically dripping water has no harmful effects
2	Dripping water, enclosure tilted up to 15 degrees	Vertically dripping water has no harmful effects when enclosure is tilted at an angle up to 15 degrees of normal vertical position
3	Spraying water	Water sprayed at angles up to sixty degrees from the vertical position has no harmful effects
4	Splashing water	Water splashed against the enclosure from any direction has no harmful effect
5	Water jets	Water projected by a nozzle (6.3 mm) against enclosure from any direction has no harmful effects
6	Powerful water jets	Water projected in powerful jets against the enclosure from any direction has no harmful effects
7	Temporary immersion in water	Ingress of water in harmful quantity is not possible when the enclosure is temporarily immersed in water under standard conditions or pressure and time
8	Continuous immersion in water	The equipment is suitable for continuous immersion in water under conditions more severe than for numeral 7

7.0 REFERENCES

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