SHOTPOINT® (a Databuoy Product)

The purpose of this integration guide is to outline how the ShotPoint® system integrates with the exacqVision system in order to capture imagery from nearby cameras in the event of a gunshot. This integration guide applies to users of both indoor and outdoor versions of the system.

Note: this guide only covers the configuration and operation of the ShotPoint® gunfire reports and video cueing interface that integrates with exacqVision. This guide does not cover full details on the ShotPoint® system.

ShotPoint® System Overview

ShotPoint is an acoustic gunfire detection system. It accurately detects and locates on gunfire and in some cases the trajectory and caliber of the bullet. ShotPoint operates indoors and outdoors (see Figure 1a and 1b). The sensor nodes can be attached to ceilings or walls or packaged within lighting. The exacqVision - ShotPoint® integrated solution enables first responders, security personnel, and even the public to have a real time alert that includes imagery when a shooter emergency happens. While each deployment is customized for the needs of a customer, each consists of a group of sensor nodes that connect to one or more fusion modules. The fusion modules take detection reports from the sensor nodes and use those to compute the location of the gunshots and send reports. The shot reports can be sent to the exacqVision system in order to cue nearby video cameras to the presence of the shooter.

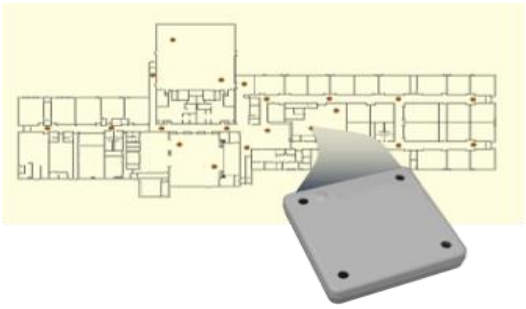

Figure 1a) Indoor Solutions

Figure 1b) Outdoor Solutions

For more information about the ShotPoint® system go to www.dbuoy.com.

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Exacq Integration Requirements

Exacq software requirements

- exacqVision client version 8.2.2 or higher
- exacqVision server version 8.2.2 or higher

ShotPoint® system requirements

- ShotPoint® fusion node deployed on Cubi (FU61-CO, FU61-CI) or fusion software loaded on higher level computer (FU71-VI).

ShotPoint® System Configuration

The ShotPoint® system basic configuration (Figure 2) consists of:

- multiple sensor nodes that are installed at the location;
- a sensor fusion module located on the same data network as the sensors that computes the shot solution;
- exacqVision software that processes shot notification messages;
- database of shot reports and associated imagery retrieved from exacqVision.

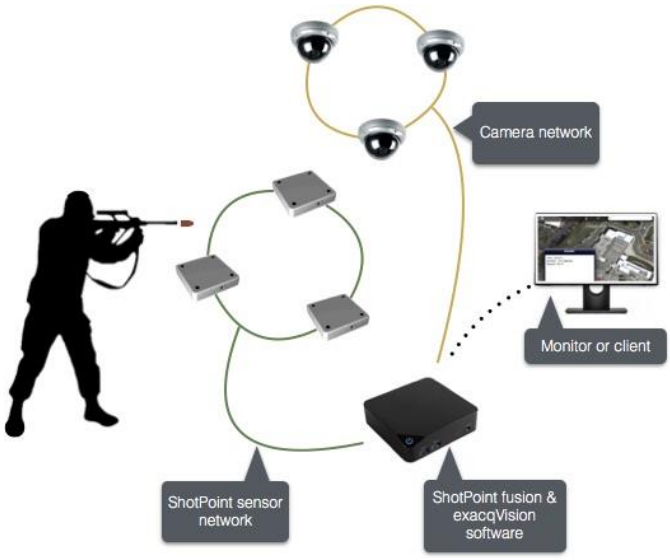

Figure 2) Basic System Configuration includes multiple acoustic sensors, at least one network fusion device, exacqVision software and database of shot reports.

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ShotPoint® Setup Application

The **ShotPoint® setup application** is used in the system setup process. A screenshot shown in Figure 3, illustrates several features of the application:

ADD - Selecting the ADD button creates several types of point on the map:

- Origin. Reference for relative measurements and link to GPS map.
- Anchors. Links the relative survey points and the GPS map, also used to link floorplan data onto the GPS map coordinates.
- Position ID. Locations of other points including:
  - Node ID. Position ID where a sensor node is located.
  - CameraID. Position ID where a camera is located.
  - Zone Strings. A string of Position ID points that define a **"Zone".**

REFINER – Tool to enter refined measurements and update selected positions.

RULER – Displays labels showing distances between points

DETAIL – Enables manual entry of survey measurements.

SAVE – Saves changes.

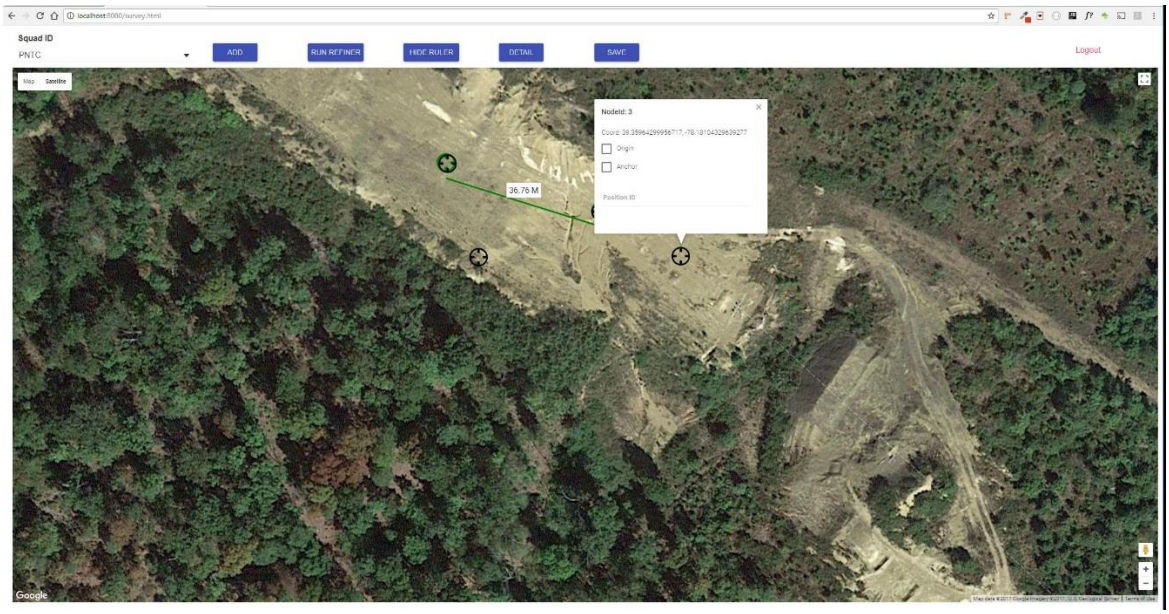

Figure 3) Sample screenshot from ShotPoint setup application illustrates placement of node positions onto a map with node coordinates and a label showing relative distance to a second node.

Note: The ShotPoint® system setup is specified in the purchase order and sensors must be installed and configured by Databuoy authorized engineers and/or resellers. For more information on this application contact Databuoy at info@dbuoy.com.

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ShotPoint® Reporting System

Shot Reports Overview

The ShotPoint® fusion software outputs a time-stamped shot report at the moment a gunfire event occurs. The shot reports may be pushed to specified endpoint in standard formats (JSON, .txt, .kml, .csv). The reports contain an exact time-stamp, the location of the shot including elevation, and the Zone if one has been defined for the area of the shot. Shot reports may also contain the trajectory and caliber of the bullet.

Shot Zones

A shot Zone (see Figure 4) is an area of a floorplan or map, defined at installation, wherein a shot event may by located. The purpose of defining a Zone is twofold:

- Provide a recognizable name, such as “Gym” or “Cafeteria” that can direct users to the area where the shot even occurred.
- Associate the shot event location to camera coverage areas so that the correct camera(s) or preset(s) that have been set up in the exacqVision system are automatically cued.

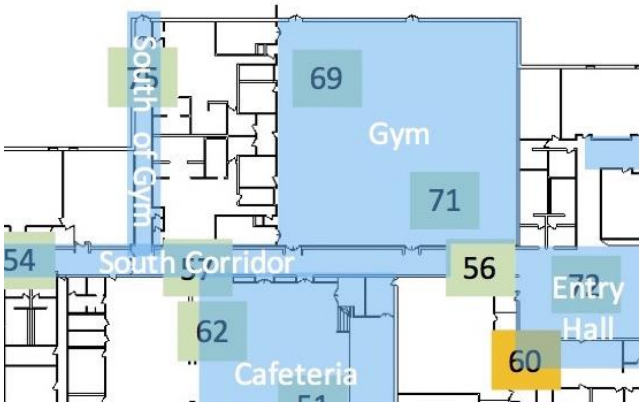

Figure 4) Zones are used to associate shot locations with cameras that can be cued.

(Shot Zones continued)

Zones are defined by entering a string of points on the map or floorplan in the **ShotPoint® setup application**. The zones must be assigned a unique name or **ZoneID**. Zones must have a convex shape. When deciding on the best size and shape of the zone, a number of factors must be considered:

- The ZoneID area must be a convex shape.
- A total of 1-4 camera views may be associated with one ZoneID.
- Multiple PTZ camera footprints can be parsed into multiple ZoneIDs.
- A default ZoneID is assumed for areas outside of all other ZoneIDs.
- If Zone areas overlap, the ZoneID with center of mass closest to the gunshot location is selected.

Associating Camera Views to Zones

With camera views associated with ZoneIDs, the ShotPoint® application works automatically to connect to exacqVision when a shot occurs. The cameras or PTZ preset views may be associated with each ZoneID using the form of a lookup table (see Table 1) that is read by the ShotPoint® application.

ZoneID	Camera1 / PTZ1	Camera2 / PTZ2	Camera2 / PTZ2	Camera2 / PTZ2
Gym	69	71	-	-
South Corridor	57	-	-	-

Table 1) ZoneID-Camera Association Table example.

Image and Video Retrieval Process

This list that associates the ZoneID with camera footprint is key to successful video capture. The ShotPoint® application can execute the video capture tool in the following order:

- **Image Capture. A gunshot message prompts the application to retrieve an image from the first camera or PTZ setting listed for the ZoneID.**
- **Video Capture. A gunshot message also prompts the application to retrieve a video clip from all the cameras listed for the ZoneID. Settings for the frame rate and duration of the video clip can be changed.**
- Shot Message Annotation. The gunshot message is first annotated with the image, then a message stating "video data being retrieved" will appear, and finally a URL to each of the available video clips will appear.

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Viewing Shot Reports

Shot reports may be transmitted through messaging to a text user, linked to 3rd party applications or viewed directly in the ShotPoint application as shown in Figure 5. The shot reports show up as pins with a label that reports the total number of shots detected at that location, the ZoneID, and the date-time stamp of the most recent shot detected. There are a number of options for viewing shot reports:

- **Map/Satellite View. Either a satellite or map background can be selected.**
- **Date/Time Filter. The shot viewer can be filtered to show only shots occurring in a selected date and time range.**
- **Show Floorplan. An option to show the shots displayed on the floorplan embedded into the map is available (see Figure 6).**

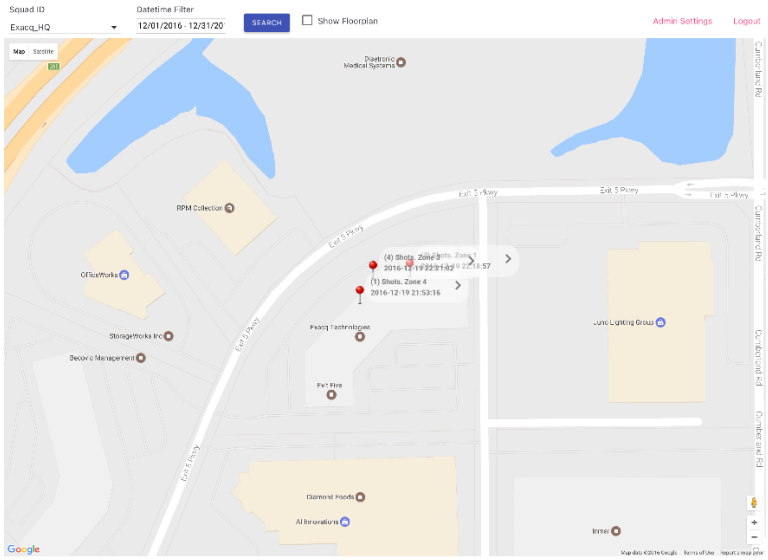

Figure 5. Shot reports displayed on map view.

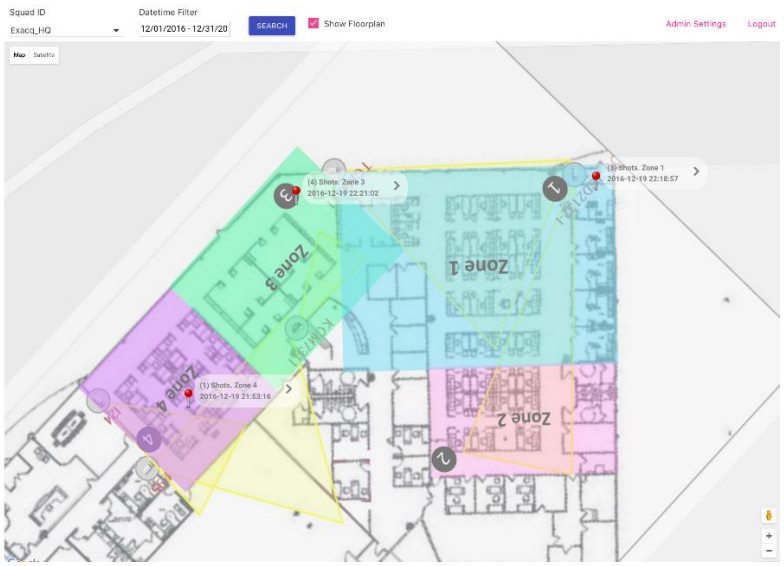

Figure 6. Shot reports displayed on floorplan view with Zone areas visible.

Note: The user must select a SquadID in order to access their authorized data partition and view shot reports. SquadID is discussed in the User Accounts section.

The gunshot message prompts the shot icon pin to bounce up and down. When the user clicks on the label the shot report will expand into a window showing the first image retrieved and the message "video clips being retrieved" (see Figure 7).

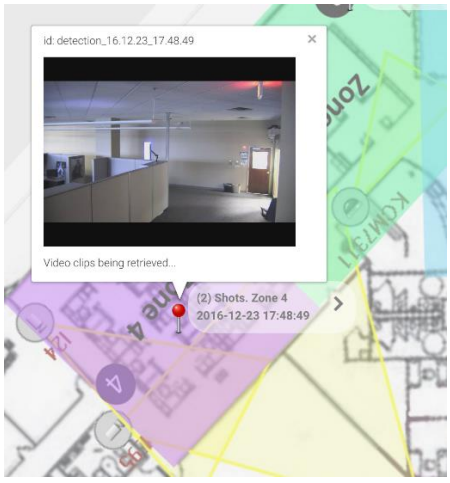

Figure 7. Shot message window showing retrieved image

Refreshing the window in a few seconds will show the URL links to short video clips retrieved from nearby cameras with the CameraID listed (see Figure 8).

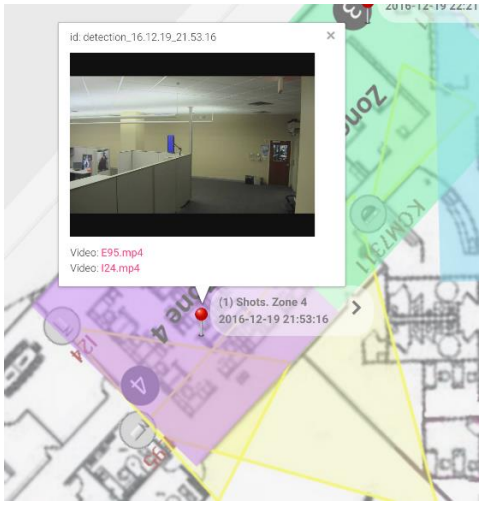

Figure 8. Shot message window with links to video data

ShotPoint® User Accounts Administration

Primary user accounts for ShotPoint® application are established exclusively for a bona fide ShotPoint® customer with an installed system. Once a customer relationship has been established, a Databuoy System Administrator will create a user Super Administrator account. The customer then administers data distribution and verifying credentials for all data users with the "Super Admin" accounts that can add/manage all other user Admin accounts related to their installation. Assistance with account creation is managed by contacting helpdesk@dbuoy.com.

The SquadID

The top-level Super Admin account is a "SquadID". Customers and other users that wish to monitor shot reports must be associated with a SquadID. The SquadID is a unique identifier that references both the owner of the purchased installation and the physical sensor emplacement. Data transmissions that emanate from a particular SquadID must verify credentials from the SquadID owner.

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The SquadID Setup

To set up a Squad Admin account, the Databuoy Admin first creates the SquadID data partition. The SquadID in the data partition is assigned the same unique SquadID identifier entered in the fusion module that manages the sensors where the data originates. Customers receive Squad Admin accounts after completion of approved customer data account applications with the Databuoy helpdesk.

Once a SquadID has been added, the Squad Admin account with **a username and password** is created for that SquadID and links to the protected data pages are provided. The Databuoy Administrator must be contacted to make changes to the Squad Admin account.

The Squad Admin can then create user accounts (see Figure 9) to allow others to view and/or receive shot reports.

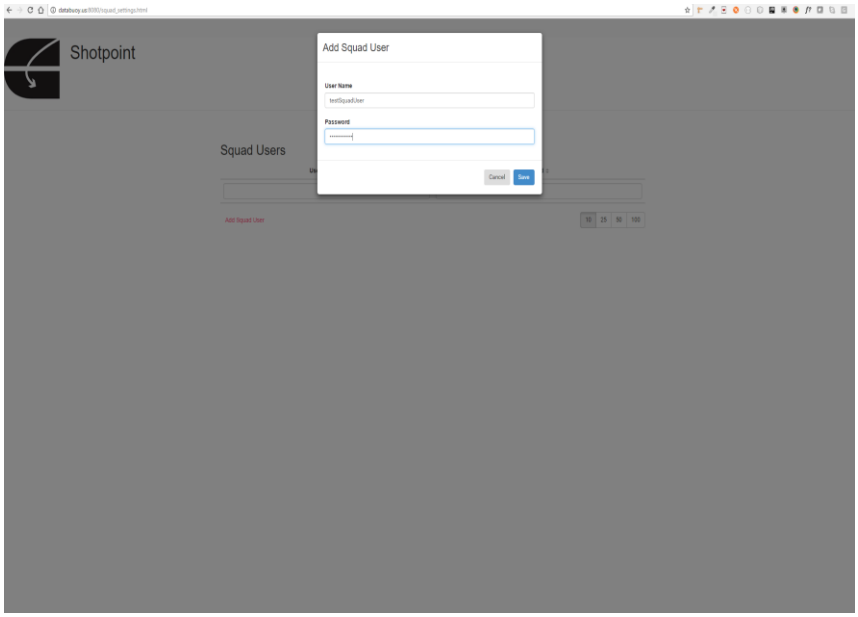

Figure 9. A SquadID Administrator can authorize new user accounts for viewing shot reports associated with a particular installation or "Squad" of sensors.

For more information on the ShotPoint® system or use of the ShotPoint® Application please contact info@dbuoy.com or call Databuoy at 703-865-8220.