# **Eagle Eye Application Note - AN023**



# Smart Video Search in the Enhanced Web Interface of the Eagle Eye Cloud VMS

2025-03-21 Revision 3.0

### **Target Audience**

This Application Note is intended for all end users of the Eagle Eye Cloud VMS who have a need to search historical video and want to better understand how Smart Video Search works. You'll learn how Smart Video Search can save time when there is a need to scrub video, how to investigate when needed, and how to find something or someone across multiple cameras and/or locations. A working knowledge of the Eagle Eye Cloud VMS is recommended before learning more about Smart Video Search.

### Introduction

Smart Video Search is a ground-breaking Al-powered solution that allows users to search for people, vehicles, or objects and immediately find the desired video across cameras at all sites — saving time and money. Users can search for people, vehicles, or objects using natural language search, similar to how people search Google or other search engines. With Smart Video Search, you can search for the following:

#### People

- Upper body clothing color (e.g., person in blue shirt)
- Lower body clothing color (e.g., person in black pants)
- Gender classification (e.g., male, female)

#### Vehicles

- Vehicle classification (e.g., car, truck, bus, motorcycle)
- Vehicle make (e.g., Ford, Chevrolet, Fiat, Tesla)
- Vehicle color (e.g., white, blue, red, black and so on)

#### Objects

• Backpack

- Handbag
- Suitcase

# Background

If you know that you are looking for a black Honda, you can simply search "Black Honda" and get a complete list of all matches across all cameras for the selected time period. To avoid the omission of video clips that might be matches, the Eagle Eye Cloud VMS utilizes a wide search criteria — as a result, users will see possible matching footage as well as exact matches.

Using AI-powered Smart Video Search capabilities fundamentally shifts how users will interact with their VMS. Eagle Eye Networks will continue training these AI Models so that you continue to see improvements, including improved accuracy and additional search capabilities.

### Three Common Use Cases for Smart Video Search

- 1. You know exactly (or have a good idea) of who or what you are looking for.
- 2. You know something happened in an approximate time period (overnight or within the last couple days, for example) but you don't know all of the details and are looking to pinpoint the event/activity you are investigating.
- 3. You are performing proactive video verification to ensure that there were no anomalies during the time period you need to investigate.

## **Smart Video Search Architecture**

The diagram below provides an overview of the architecture of Smart Video Search. This architecture enables the addition of intelligence to any supported ONVIF camera. When motion is detected, the Bridge/CMVR sends key images and the associated video to the Eagle Eye Networks cloud for real-time processing. Multiple AI models running in the cloud extract information from these key images and tag the videos; the result is a corpus of metadata. When search criteria are entered, the Eagle Eye Cloud VMS searches the metadata and displays all matching key images.



Key images received are passed through multiple AI models for inference. For example, when a person is detected, a cropped image of the person is passed to an additional AI model to retrieve clothing color. Similarly, after detecting a vehicle, the crop of the vehicle is passed to another AI model to determine the vehicle's type or make.



# **Recommended Bridge/CMVR and Camera Settings**

Smart Video Search requires no additional hardware and works with all Eagle Eye Networks Bridges and CMVRs. Key images are processed by Eagle Eye Networks' data centers, so make sure that the Bridge/CMVR is not configured to use "Minimum Bandwidth Mode." This mode uses the least amount of bandwidth possible, but overrides any preview transmit settings of the cameras and puts the Bridge into "on demand" only mode. This is not ideal unless absolutely required. See below for an example of

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Note: Do not select Minimum Bandwidth Mode

The recommended resolution of preview video is 640x360. (This size, however, depends on aspect ratio; 640x480 is another option to choose.) The goal of selecting the resolution is to provide just enough pixels within the region of interest to detect a person or vehicle with high accuracy.

When motion is detected, the key image sent to the Eagle Eye cloud will use the preview video resolution that was defined within camera settings. As a reminder, go to the Camera Settings tab -> Resolution -> Preview Video Resolution and choose 640x360 or higher. On a motion event, a thumbnail of this resolution will be sent to the cloud as a key image. Note that higher resolution improves the accuracy of detection. The trade-off to keep in mind is increased bandwidth: as resolution and accuracy increase, so does the use of bandwidth.

The Preview Video -> transmit mode should be set to "Always" as shown in the image below. Do not select the "On Demand" mode.

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Note: Select Preview Video Resolution of 640x360 or higher

# **Smart Video Search Features**

#### Search for persons or vehicles or objects

Smart Search revolutionizes the way users interact with video surveillance footage, offering seamless access to a wealth of information. With this feature, users can easily pinpoint specific individuals, vehicles, or objects across multiple camera feeds, enhancing efficiency and security. Examples:

• **Person Search:** Imagine a scenario where a user needs to locate a person wearing a distinctive blue shirt in a crowded area. With Smart Video Search, they can input the description "person in blue shirt" and instantly access relevant footage, streamlining their search process.



• Vehicle Search: In a traffic monitoring scenario, authorities may need to identify a red sedan involved in a hit-and-run incident. By entering parameters such as "red sedan," and relevant time frames, users can swiftly isolate the desired vehicle within the video data, facilitating prompt action.

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• **Object Search:** Consider a retail environment where a handbag theft has occurred. Store management can utilize Versatile Search to narrow down footage to instances involving individuals carrying a handbag during the specified timeframe, helping in the identification of the perpetrator.



# **Filters in Video Search**

The enhancements include the addition of filters for **Layout**, **Site**, **Tag**, **Bridge**, **and Camera**, aimed at improving search efficiency and user experience. These filters support name-based searching.

#### **Benefits:**

- Users can now filter video search results more precisely using the new filters.
- Name-based searching and multi-selection capabilities make it easier for users to find relevant videos.
- Filter selections are saved in the web URL; URL is shared with others, the filter selections are retained and applied automatically.

#### Key Features:

- 1. New filters added:
  - Layout: Filter videos based on the layout configuration.
  - Site: Filter videos by site location.
  - Tag: Filter videos using tags.
  - Bridge: Filter videos by bridge.
  - Camera: Filter videos by camera.

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#### 2. Name-Based Filtering:

• All filters support searching by name, enabling users to quickly locate specific items.



#### 3. Multi-Selection Support:

- **Small Accounts** (less than 4,000 cameras): All filters (Site, Tag, Bridge, Camera) support multi-selection.
- Large Accounts (more than 4,000 cameras): Site and Tag filters are single-select, while Bridge and Camera filters are multi-select.

#### 4. Default Data Load and Pagination:

- By default, 50 items are loaded in each filter.
- As the user scrolls to the bottom of the list, a paginated API call is triggered to load the next set of items.

#### 5. Clear Filters Functionality:

- A "Clear Filter" button resets all applied filters.
- The time range is reset to "last 24 hours" from the current time.
- Search results are updated to reflect the cleared filters and reset time range.

#### 6. URL Persistence:

- Filter selections are saved in the web URL.
- When the page is refreshed or the URL is shared, the filter selections are retained and applied automatically.

#### **Performance Optimization**

- Small Accounts: All filters support multi-selection to provide flexibility.
- Large Accounts: Site and Tag filters are single-select to prevent performance degradation, while Bridge and Camera filters remain multi-select.

#### User Interface Updates

• The SuperFilter UI and functionality have been removed to simplify the user experience.

#### URL Persistence

- Filter selections are saved in the web URL.
- When the page is refreshed or the URL is shared, the filter selections are automatically applied.

#### Search For Only Moving Objects

The new functionality allows users to search exclusively for moving objects (person or vehicle). This feature is designed to enhance the user experience by enabling more targeted and efficient searches, particularly in scenarios where users are only interested in moving objects.



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#### Benefits:

- Users can quickly filter out non-moving objects, saving time and effort.
- Delivers more relevant results for users specifically interested in tracking or analyzing moving objects.
- Provides flexibility to include or exclude non-moving objects based on user preferences.

#### Key Features:

- "Only Moving Object" Toggle Button
  - A toggle button is introduced in the search interface when users search for person or vehicle objects.
  - By default, the toggle is enabled, meaning the search results will only include moving objects.
- Flexibility to Include Non-Moving Objects
  - If the user disables the toggle, the search results will include both moving and non-moving objects.
- Applicability
  - This feature is only applicable to searches for person and vehicle objects.

#### Video Search by "Group by cameras"

Easily organize and streamline your video search results by enabling the "Group by cameras" feature. Simply navigate to the settings menu, accessible via the three-dot menu located in the top-right corner, and activate the "Group by camera" option. Once enabled, your search results will be conveniently grouped according to the respective cameras, allowing for efficient viewing and analysis of footage from each individual camera feed.



#### Video Search sorting option

Efficiently manage your video surveillance data with the Video Search sort by functionality, offering flexible sorting options tailored to your needs. With the help of "Sort by" functionality you can effortlessly organize search results based on various criteria such as Most recent first, Oldest first and Event frequency.

Note: "Event frequency" option will display only when the "Group by camera" option is enabled.



Example: When searching for a specific entity like a "white car," results are presented sequentially, beginning with the most recent occurrences. Users have the flexibility to further refine their analysis by sorting results based on either the latest or oldest instances. This comprehensive approach extends across all camera feeds, empowering users to effectively track and monitor activity over time, facilitating comprehensive situational awareness and informed decision-making.



#### Video Search browser navigation

Users can effortlessly navigate through different pages using their browser's back functionality. With a simple click on the back button, users can seamlessly return to the previous page they were viewing, enhancing their browsing experience and enabling smooth navigation within the application. This intuitive feature ensures that users can easily backtrack to review previous content or retrace their steps as needed, promoting a user-friendly interface and facilitating efficient interaction with our platform.

Example: Imagine a scenario where a user initially searches for a "Person in a red shirt" within our application. After reviewing the results, the user decides to update their search criteria to "Person in a yellow shirt." However, upon further consideration, the user wishes to revisit the previous search results. By clicking the back button in their browser, the user returns to the previous search for "Person in a red shirt," allowing them to pick up where they left off.

First search - "Person in a red shirt"



#### Second search - "Person in a yellow shirt"



When you press the browser back it will take you to the previous result, i.e., "Person in a red shirt".

#### Video Search URL sharing

Eagle Eye Smart Video Search now includes URL sharing, empowering users to easily share their search results with others. In scenarios where users identify relevant video footage, such as locating a "Person in a yellow shirt," users can copy and share a unique URL corresponding to their search query. This URL encapsulates the specific search parameters and results, allowing users to share valuable insights with colleagues, customers, or stakeholders.



#### **Events navigation**

Previous event (<) - Navigate to the previous event. Next event (>) - Navigate to the next event.



#### History browser

**Option 1** - One click of the clock icon takes you to the History Browser.







Option 3 - One click of the clock icon in the events screen takes you to the History Browser.





**Option 4 -** Click on the three-dot menu in the events screen and select History Browser.

#### Metadata search

This is a search based on the description of a person or vehicle. For example, a "Person in gray upperwear" or "Green car." Once a person of interest is identified, simply click on the person or the metadata listed below the image to broaden the search and look for similar metadata across the site.



In this example "Person in gray upperwear" is selected.



#### Find similar images

Click on the three-dot menu in the events screen and select "Find similar images." On the selection of "Find similar images," the system will search for all metadata in the current event. In the below example, it would search for both "Person in gray upperwear" and "Green car."



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#### Customize Video Search with date-time range picker

Customize your video search experience with the Date and Time Range Picker, featuring convenient preset selection option:

- Last 24 hours: Instantly retrieve video feeds from the past 24 hours, starting from the current moment, ensuring real-time access to recent activity.
- **Today:** Seamlessly navigate to today's footage, spanning from the stroke of midnight to the present moment, simplifying daily surveillance tasks.
- **Yesterday:** Access video recordings from yesterday, covering the entire day from midnight to just before midnight, facilitating retrospective analysis.
- Last 7 Days: Gain comprehensive insight into the past week's events, enabling thorough monitoring and review.
- **Last 30 Days:** Dive deeper into historical data with a month-long time frame, capturing footage from the past 30 days up to the current time.

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#### Density mapping

The Density Map helps you quickly key in on video activity. The lighter the color square, the less activity there is for that camera. No color/gray scale indicates that there was no activity during the time selected for the search.

In the example below, the Density Map is showing periods of time where no key images were identified (in gray) and more active periods marked with various shades of blue. The dark blue squares in succession on the right half of the image indicate periods of high activity. Hovering over one of the squares will show you a pop-up text indicating the time block and number of key images tagged. Click on the image and it will outline the square, update metrics, and take you directly to the key images for further investigation.



Note: You can see the Density Map only for 24 hours or less

## **Accuracy of Smart Video Search**

Smart Video Search is a tool meant to help find an object of interest in the video, thereby reducing the need to manually watch and search through video. Since the objective is to help the end user find possible objects of interest, the Video Search AI uses an expanded definition of attributes to provide more search results to increase the chance of finding objects of interest.

Use of primary and secondary colors: When a color attribute is used for search, Video Search provides results with the color selected by the user, but also with results that are similar to the mentioned color. This is done intentionally to show the likely object of interest by displaying results that may be of interest to the user. Below is one of the results for a search for a "person in blue upperwear."



The same result would appear for a search for a "person in gray upperwear" as well.

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Note: This loose matching is not an error or a bug, but an intentional approach to increase the chances of finding what the user is looking for, both because colors can appear different under different lighting conditions and because color terms themselves can be ambiguous.