

EXIF REMOVAL

- **Do** prevent your device(s) from capturing geo-location data when taking pictures. Remove EXIF metadata from images taken by smartphones or digital cameras.
- **Do** use privacy settings from the app to limit the audience to only yourself or close friends and family before uploading pictures.
- **Do** assume that anyone can see, copy, or forward photos that are posted online. Even with no EXIF data, the content of images may contain identifying information, including people and locations.
- **Don't** allow apps to automatically upload and share captured images (e.g. Instagram, Flickr.)
- **Don't** assume that device settings remain the same after updates or over time. Verify the settings frequently.
- **Don't** upload pictures with landmarks, easily identifiable structures, or signs indicating location.
- **Don't** give apps used for sharing photos permission to access your device's location or other information.

EXIF

Exchangeable Image File Format (EXIF) is a standard format for capturing, storing and exchanging image metadata. Metadata is the description and context of files that allows computers to organize, find, and display information about a file. For example, when a music app displays the artist, year, album, and song name of an mp3 being played, it's using the mp3's metadata. Images and videos also contain metadata that can show time, date, camera settings, copyright information, and location. Some social networks and photo-sharing sites, such as Flickr, Google+, and Dropbox, have features that display EXIF data alongside images. Facebook, Instagram, Twitter, and Reddit, do not share EXIF data publicly. EXIF metadata are listed as tags that store information that can be used to identify an individual. The chart below shows the tag categories, the metadata included in each category, and the potential security risks associated to each piece of metadata.

Tag Category	Important Tags	Security Implications
Geo-location	GPSLongitude, GPSLongitudeRef, GPSLatitude, GPSLatitudeRef, GPSTimeStamp, GPSTimeStamp, GPSAltitude, GPSAltitudeRef, GPSProcessingMethod	Ability to reveal the exact location of private places, such as homes or offices. Some photo sharing sites, including Google+ and Flickr publicly display image GPS coordinates on a map.
Timestamps	ModifyDate, DateTimeOriginal, CreateDate	Creates a log of behavioral patterns and personal timelines.
Camera	Make, Model, Serial Number	A unique serial number identifies the particular device for an image or set of images.
Authorship	Artist, Owner Name, Copyright	Links images with a name or organization.
Image Summary	ImageDescription, UniqueImageID, UserComment	Potentially reveals identifying information about the content of the images, such as captured persons or locations.

Prevent the Capture of Geolocation Data

iOS

If iOS location services are turned off, images captured with the native iPhone camera app will not contain geo-location EXIF data.

1. Select the "Settings" app. Click "Privacy" > "Location Services."
2. Turn off location services altogether or for the iPhone's camera applications.
3. Return to the "Settings" app. Click "Privacy" > "Photos."
4. Disable permissions for other apps to have access to the photos stored in the device's camera roll.

Android

Turning off location storage in the Android camera application prevents captured images from containing EXIF data.

1. Open the camera app and go to "Settings" by tapping the gear icon. This varies from phone to phone since there is no standard camera app on Android devices.
2. After that, scroll down until you see 'location tags' and touch the toggle switch to disable geotagging of photos. The wording may vary slightly between devices.

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Prevent the Capture of Geolocation Data Continued

- Taking a screenshot of a photo on a device running iOS or Android will create a new image containing no EXIF data. To take a screenshot on an iOS device, simultaneously press the lock and home buttons or Google how to take a screenshot on your specific Android.
- Even photos taken in airplane mode contain geo-location data. It is recommended to turn off location services/storage on your smartphone camera application, as shown on the previous page.
- Remember that uploading or sharing a lower quality image will still contain EXIF data. EXIF data and image quality have no correlation.
- It is important to not only lock down Apps such as Snapchat, Instagram, and Twitter (see corresponding Smartcard), but to also remove the metadata from them as best as possible.

EXIF Removal Apps and Programs

Reviewing & Removing EXIF Data for iOS

1. Download the free US-based "Photo Investigator" app from the App Store.
2. Open the app and tap the gallery icon on the bottom left.
3. To view EXIF data, you can tap on the various icons below the image.
4. To remove exif data tap "Metadata" and then select "Remove."
5. An easy way to identify photos that have EXIF data with geolocations is to view your "Places" folder. Any images that appear in this folder have geolocation data, once you disable the geotagging feature and remove your EXIF data, this folder should be empty.

Metadata Remover for Android

- "Metadata Remover" is a free US-based app that deletes all EXIF data from image files stored on your Android device.
1. Download a Photo Exif Editor app from the Play Store.
 2. Open the app and select an image.
 3. The EXIF data will be removed.
 4. Processed images will be saved separately from the original file.

Reviewing & Removing EXIF Data in MacOS

Use the "Image Optim" (UK based) application (available at <http://imageoptim.com/>) to remove EXIF data on your OS X device.

1. Drag the photos for EXIF removal into the app window and wait for a green check mark to appear next to the file name.
2. Check that the EXIF data has been removed by right clicking the image and selecting "Get Info." EXIF data is listed under "More Info."

Reviewing & Removing EXIF Data in Windows

Use the Windows OS to verify EXIF data has been removed.

1. Navigate to an image in File Explorer. Right click the image and select "Properties."
2. Select the "Details" tab. You can examine EXIF metadata that is available.
3. Click "Remove Properties and Personal Information."
4. You can click "Create a copy with all possible properties removed" to remove all potential properties or select individual properties such as GPS information. Click "OK."

Geo-localization

Even with EXIF metadata removed, images containing vegetation, addresses, business names, road markings, and landmarks allow someone to identify the location a photograph was taken. Geo-localization, the determination of a location of an image through visual information, is currently being used and improved upon. This will allow computers to compare a picture without EXIF metadata to millions of other pictures found on the internet that do have location metadata. Once the computer discovers a close match between two pictures, it can apply the location metadata of one structure to its match that does not have location metadata.