

Remote Sensing Interface Control Document

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This document describes the interfaces between the Remote Sensing aircraft/satellites and Airborne Intel Tool in the Intterra Maps app. Intterra uses Amazon S3 as the data exchange mechanism for remote sensing data.

2023 updates to this document

- Removed **Mission Notes** as a product type.

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Overview

Mission Operations and Display in Airborne Intel Tool

Combined, the Airborne Intel Tool and the Remote Sensing systems provide near-real-time information to operations and partner agency personnel on wildfire and public safety events. The Airborne Intel Tool and the Remote Sensing systems have been designed to allow a user to monitor and receive intelligence from a Remote Sensing mission as well as to access data from previous missions. **Figure 1** shows the mission list and the stages of an individual Remote Sensing mission as tracked within the Airborne Intel Tool.

Figure 2 shows the interface for a user selected mission.

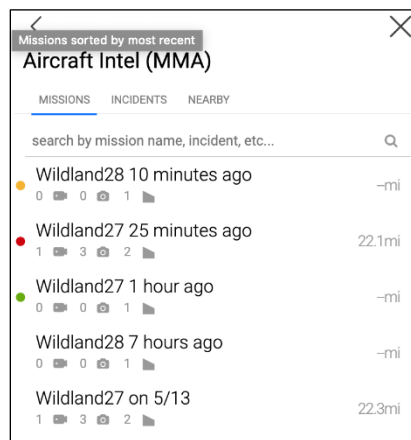


Figure 1. Mission list and status. Planned (yellow), airborne (green), and collecting (red).

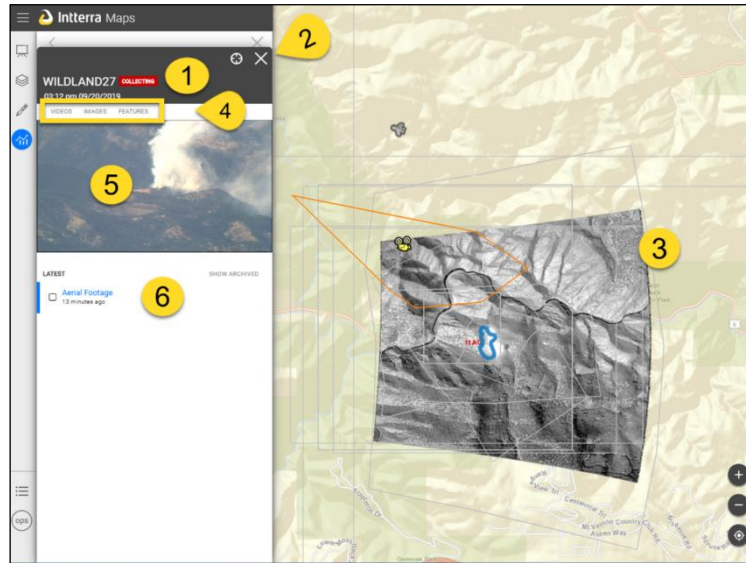


Figure 2. Mission products and interaction. 1) mission details, 2) zoom to location, 3) map with mission products, 4) selection of type of products, 5) preview, and 6) product list. The list and map are interactive. Users can select products to download and manage the view.

Remote Sensing Product Types

The follow types of remoted sensing products can be passed from the aircraft directly to the client's information management system.

- 'Tactical' vector products mapped by the mission crew to be projected on the map.
- Imagery that is reprojected or not reprojects on the map.
- Video segments and live streaming

Data Exchange Overview

A secure Amazon S3 file sharing system is used by Remote Sensing and Intterra to exchange data. The Amazon S3 system requires an authorization credential issued by Intterra for data exchange. Credentials will be sent to the Remote Sensing provider by the Intterra account manager/Integrations specialist during their onboarding period.

Intterra now has an optional open-source data shipping app available. It removes the possibility of incorrect file naming and thus ensure all files are processed correctly in our system. This tool will upload products to the appropriate location with the correct naming convention based on the file extension alone.

File Names

Proper file naming is critical for the products to function properly in the Intterra application. Blocks of text from the file name are parsed using underscores as delimiters and utilized to manage how the products are grouped, displayed and labeled in the Intterra Airborne Tool.

Integrations Steps

1. **Obtain Amazon S3 credentials from Intterra**
2. **Chose a file naming convention.** There are two naming conventions available –
 - Option A (Standard) – this is a legacy file naming convention. Unique advantages -
 - A **Mission Designator File** is not required.
 - Option B (GeoOps) –Unique advantages -
 - Product types and naming are more closely aligned with the NWCG GeoOps standard for fire GISS mapping. This is helpful for users who download the products to share.
 - Product descriptions can be included in the file name for Video products (in addition to tactical) that will display next to the product name in the tool – i.e. Intense heat, crew working, Div B, etc.
3. **Prepare Products** per Product Specifications and File Naming below.
4. **Provide Intterra the tail number(s)** of the aircraft.
5. **Schedule testing**
6. **Go live!**

Product Specifications

Note: Naming of product files is covered in the following section.

Mission Designator File

Description

The Mission Designator File is used signify to users that an active mission is pending or underway and to associate (group) products to a mission in the tool. The file name will be used to show a mission as active.

The file is **REQUIRED** if using Naming Convention Option B and subsequent missions with the same mission name will be conducted within 24 hours.

The mission name is commonly the incident name if known. Multiple mission (incident) names can be used on one flight. The Mission Designator File is loaded when a mission is planned and deleted when then the mission is completed and prior to starting another mission.

IMPORTANT:

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- It must be loaded prior to the first products AND have a DateTimeStamp in the file name that precedes the products for the products to properly associate to the mission.
- This file needs to be deleted by the mission aircraft when the mission is complete.

Format

This is an empty **.txt** formatted file

Amazon S3 Folder (bucket):

/MISSION/

Amazon S3 Folder (bucket):

/TACTICAL/

Aircraft Location

Description

Intterra now tracks aircraft by tail number using data from a third-party aircraft tracking service. Please provide a tail number to associated with your S3 Bucket.

In the situation where the aircraft location is desired to be displayed and it is not available in the third-party aircraft tracking service an Aircraft Location File can be provided throughout the mission.

Format

A **.kml** file with the aircraft location.

Style

<https://cdn.intterra.io/public/icons/aircraft.png>

Amazon S3 Folder (bucket):

/AIRCRAFT/

Over-write the Aircraft Location File at the desired frequency (greater than 30 seconds).

Feature (Vector) Products

Description

These are 'tactical' vector products mapped by the mission crew. The types and naming vary by the chosen naming convention.

File Format

This is an **.kml** formatted file.

Metadata Specification (Optional)

Tactical products may contain metadata per feature that can transfer a narrative into Airborne Intel Tool features. The expected convention is to use the data-field tag within a KML element to specify for Airborne Intel Tool which target field to apply a metadata value to.

Examples:

- Simple

```
<Placemark>  
<description> narrative text </description>
```

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- Table

```
<Placemark>
<description><![CDATA[<table>
<tr><td>Sensor</td><td data-field="Sensor">Burma</td></tr>
<tr><td>Name</td><td data-field="Name">Detection</td></tr>
<tr><td>DateCollected</td><td data-field="DateCollected">2016-09-21 12:00:00
]]></description>
```

Product Types and Styles

Using the a proper [ProductType] in file names is **REQUIRED**. Using the associated Styles/Icons are highly recommended.

Product Types

Description	ProductType	Symbol
Fire Perimeter	PERIM	Blue polygon
Heat Perimeter	HeatPerimeter	Blue polygon
Hot Spot	HOTSPOT	https://cdn.intterra.io/public/icons/isolated-heat.png
Isolated Heat	IsolatedHeat	https://cdn.intterra.io/public/icons/isolated-heat.png
Intense Heat	IntenseHeat	Red polygon, 3-point, 50% opacity
Scattered Heat	ScatteredHeat	Red polygon, 3-point, 25% opacity
Structures	Structures	https://cdn.intterra.io/public/icons/structure.png
Infrastructure	Infrastructure	https://cdn.intterra.io/public/icons/infrastructure.png
Water Sources	WaterSources	https://cdn.intterra.io/public/icons/water-source.png
Route	Route	Green line, 3-point
Detection	DETECTION	https://cdn.intterra.io/public/icons/detection.png
Unburned Area	UnburnedArea	Green polygon
Attended Campfire	AttendedCampfire	https://cdn.intterra.io/public/icons/campfire.png
Fire Line	AFL	Red line
Retardant	RETARDANT	Purple line
Life Safety	LIFESAFETY	Yellow point
All Hazard	ALLHAZARD	Green point

Amazon S3 Folder (bucket):

/TACTICAL/

Imagery Products

Description

Image products can be provided as a geotiff or a png/aux combination. These images can be designated as 'to be reprojected onto the map' or 'depicted as-is with no reprojection'.

Format

Imagery products can be provided as:

- OCG-formatted GEOTIFF files. See OCG specification.
 - Required Projection: WGS-1984, EPSG 4326, Decimal Degrees (not UTM)
 - Required Size: <5MB (to preserve functionality in low comms environments)

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- Preferred Image Format: Interleave by Pixel, Byte, 3-band, JPEG Compression

GeoTiff files currently do not support the option to NO WRAP.

- A pair of formatted files consisting of a **.png** graphic and a **aux.xml** file with metadata. Both files are required for Airborne Intel Tool to generate and display a product. Airborne Intel Tool processes the imagery and produces a **.kmz** file for display. The **.kmz** is saved using same naming convention and reloaded to the /IMAGERY/bucket. **NOTE:** the **.png.aux.xml** file must finish loading in S3 first. This normally will happen when sent simultaneously due to the smaller file size.

.png.aux.xml file – must contain the following data for processing. The **aux.xml** file must be structure and include the below:

- Coordinates – these must be provided to identify location of image

```
<PAMDataset>
<Metadata domain="IMAGE_STRUCTURE">
  <MDI key="INTERLEAVE">PIXEL</MDI>
</Metadata>
<Metadata>
<GCPLIST Projection="GEOGCS[&quot;WGS 84&quot;;DATUM[&quot;WGS_1984&quot;;SPHEROID[&quot;WGS
84&quot;;6378137,298.257223563,AUTHORITY[&quot;EPSG&quot;;&quot;7030&quot;]],TOWGS84[0,0,0,0,0,0],AUTHO
RITY[&quot;EPSG&quot;;&quot;6326&quot;]],PRIMEM[&quot;Greenwich&quot;;0,AUTHORITY[&quot;EPSG&quot;;&quot;
8901&quot;]],UNIT[&quot;degree&quot;;0.0174532925199433,AUTHORITY[&quot;EPSG&quot;;&quot;9108&quot;]],AU
THORITY[&quot;EPSG&quot;;&quot;4326&quot;]]">
  <GCP Id="UpperLeft" Pixel="0.5000" Line="0.5000" X="-1.079226860000E+002" Y="4.000461400000E+001" />
  <GCP Id="UpperRight" Pixel="1919.5000" Line="0.5000" X="-1.079261730000E+002" Y="4.000763300000E+001" />
  <GCP Id="LowerRight" Pixel="1919.5000" Line="1079.5000" X="-1.079226840000E+002" Y="4.001002500000E+001" />
  <GCP Id="LowerLeft" Pixel="0.5000" Line="1079.5000" X="-1.079193800000E+002" Y="4.000705500000E+001" />
</GCPLIST>
</PAMDataset>
```

- Annotation – **optional** metadata element to add annotations to images

```
<PAMDataset>
<Metadata>
  <MDI key="DESCRIPTION"> narrative text </MDI>
</Metadata>
</PAMDataset>
```

Product Types

Using the a proper [ProductType] is **REQUIRED**.

Description	ProductType
Electro-optical Color Imagery	EOimage
Infrared Imagery	IRimage
Heat Source Imagery	HSimage

Amazon S3 Folder (bucket):

/IMAGERY/

Video Products

Description

Video products are formatted files derived from the raw video data collected by the aircraft systems. Videos can be segments to be played (maximum file size is 100mb) or a live stream -

- Option 1: a video product **.mp4** with a **.kml** formatted file designating video location.
- Option 2: a transport stream video with a valid video segment, a valid KLV segment, and an optional audio segment.
- Option 3: Public live stream video (custom integration).

Format

Video can be provided as:

- An **.mp4** formatted video file and a formatted **.kml** file containing registration information. Both files are required for Airborne Intel Tool to generate and display a product. No narrative description is available.
- A **.ts** formatted video file (and optional **.xml** file for description).
 - The **.ts** file format allows for embedding multiple streams of data – for proper processing, the following streams are needed
 - Video – required
 - KLV Data – required for geospatial display
 - Audio – optional
 - The following steps are performed to process **.ts** files
 - Stream Identification – determine the contents of the file
 - Creation of mp4 – using video and audio
 - Creation of a reformatted **.ts** file containing only one video stream, one audio stream, and one KLV stream – saved in /SA for use by external systems like ATAK and ESRI.
 - Extraction of KLV –
 - Creation of a JSON from KLV –
 - Creation of a VIDEOCLIP.kml – placed in /VIDEO folder to allow the Airborne Intel Tool to zoom to video location.
 - If a narrative .xml file is included, the narrative information is inserted into the KML.
 - **.xml** file – must contain the following data for processing. The .xml file must be structure and include the below:

```
<PAMDataset>
  <Metadata>
    <MDI key="DESCRIPTION">narrative text</MDI>
  </Metadata>
</PAMDataset>
```

NOTE: the **.xml** file must finish loading in S3 first. This normally will happen when sent simultaneously due to the smaller file size.

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- URL of the reformatted **.ts** file (/SA) is inserted into the KML.
- Creation of a DPS **.kml** file to display the footprint of the video in SA.

Product Types

Using the a proper [ProductType] is **REQUIRED**.

Description	ProductType
Video	VIDEOCLIP or Video

Amazon S3 Folder (bucket):

/VIDEO/

File Naming

Both Options A and B

Mission Designator File

- Format: [MissionName]_[MissionDate]_[MissionTime].txt
 - [MissionName] – no spaces or underscore allowed
 - [MissionDate] – yyyyymmdd
 - [MissionTime] – hhmmZ – Must be Z (UTC) time and include the Z
- Example: *Bond_20201207_1305Z.txt*

Aircraft Location File

- Format: [MissionName]_[MissionDateTime]_[ProductType].kml
 - [MissionName] – no spaces or underscore allowed
 - [MissionDateTime] – yyyyymmddhhmmZ - Must be Z (UTC) time and include the Z
 - [ProductType] – AIRCRAFT
- Example: *Wildland27_031120192119Z_AIRCRAFT.kml*

Option A Naming Convention

There are five (5) possible blocks of text. In this document, the blocks are enclosed in [] for illustration purposes. **IMPORTANT: There can be no spaces, underscores, or special characters within each block.**

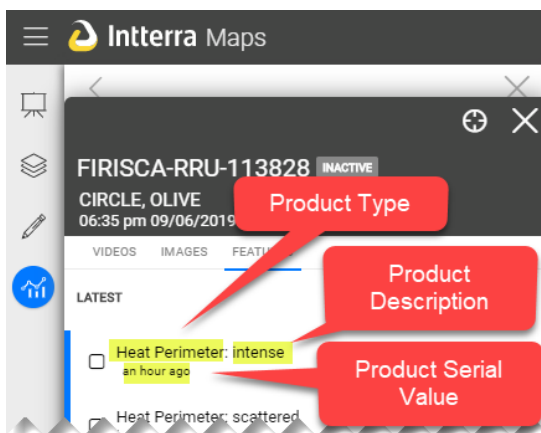
Hyphens '-' are OK.

- Naming Convention:
[MissionName]_[MissionDateTime]_[ProductType]_[ProductSerialValue]_[ProductDescription]
 - [MissionName] - no spaces or underscore allowed
 - [MissionDateTime] – mmddyyyyhhmmZ - Must be Z (UTC) time and include the Z
 - [ProductType]
 - [ProductSerialValue] – unique value to distinguish products that may otherwise have the same file name based on [MissionName]_[MissionDateTime] alone
 - Preferred* -hhmmssxxx – I.e. HHMMSS plus 3 millisecond values (x).
 - [ProductDescription] – Vector files only - Optional.to add a description to the product in the tool.

* Intterra uses the HHMMSS in the [ProductSerialValue] to display a local time for the product.

Examples in Tool

- Vector
 - *FIRISCA-RRU-113828_090620190135Z_PERIM_023512544_25Acres.kml*
- Imagery
 - *geotiff - RemoteSensing01_091620141717Z_IRImage_190435942.tif*
 - png/aux combination
 - *RemoteSensing01_091620141717Z_IRImage_190435942.png*
 - *RemoteSensing01_091620141717Z_IRImage_190435942.png.aux.xml*
- Video
 - *ts - RemoteSensing01_091620141717Z_VIDEOCLIP_190435942.ts*
 - mp4/kml combination
 - *RemoteSensing01_091620141717Z_VIDEOCLIP_190435942.mp4*
 - *RemoteSensing01_091620141717Z_VIDEOCLIP_190435942.kml*



Option B Naming Convention

This option follows a modified GeoOps naming convention pattern. Because there is a lack of mission information (unique timestamp) in the product file name, this option requires that the user submit a mission file (.txt) with the mission name. There are four (4) possible blocks of text. In this document, the blocks are enclosed in [] for illustration purposes. **IMPORTANT: There can be no spaces, underscores, or special characters within each block.**

- Naming Convention: [ProductDate]_[ProductTime]_[MissionName]_[ProductType]_[ProductDescription]
- Product Date - yyyyymmdd
- Product Time –
 - hhmmZ (Vector and Video)
 - hhmmssZ (Imagery)

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- Mission Name – the same for all products and mission designator file for a mission. A best practice is to include the aircraft/resource name and optionally the incident name or purpose, i.e. 'detection'. It recommended to keep less than 30 characters.
- Product type – Required for all remote sensing products.
- [ProductDescription] – Vector and Video files only. Optional. Acres – For HeatPerimeter ONLY. It is used to display the perimeter acres next to the product in the list.

Examples

- Vector
 - 20200801_0225Z_PineGulch_HeatPerimeter_248.kml
- Imagery
 - geotif - 20200708_20290412Z_RemoteSensing01_EOimage.tif
 - png/aux combination
 - 20200708_20290412Z_RemoteSensing01_EOimage.png
 - 20200708_20290412Z_RemoteSensing01_EOimage.png.aux.xml
- Video
 - ts - 20200708_2029Z_RemoteSensing01_Video_DivB.ts
 - mp4/kml combination
 - 20200708_2029Z_RemoteSensing01_Video_DivB.mp4
 - 20200708_2029Z_RemoteSensing01_Video_DivB.kml

Data Enrichment

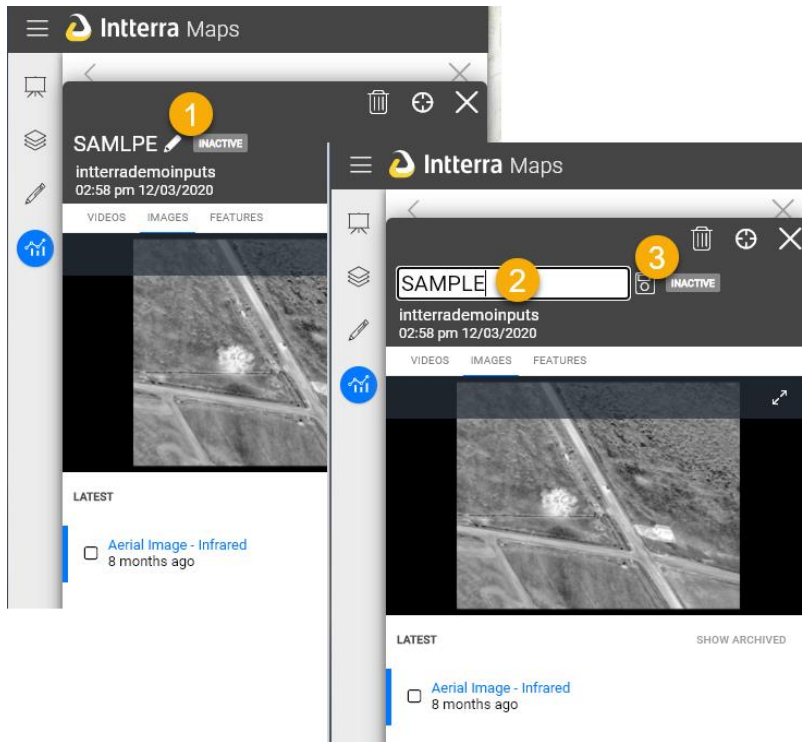
Aircraft products will be associated with Incidents from Operations Markup that are within 10KM of the product.

Data Management

As of August 2021, advanced users of the **Airborne Intel Tool** can rename and delete missions and can delete individual products that are associated with a mission. A special data role is required and needs to be set up your account admin or support@intterragroup.com.

*Mistakes happen! Sometimes products are loaded to Intterra's **Airborne Intel Tool** from the aircraft that are misnamed, misplaced or are of poor quality. There is also a need to remove products created for training and testing or that contain sensitive information. This new advance function allows managers to clean up the missions and products that they are responsible directly.*

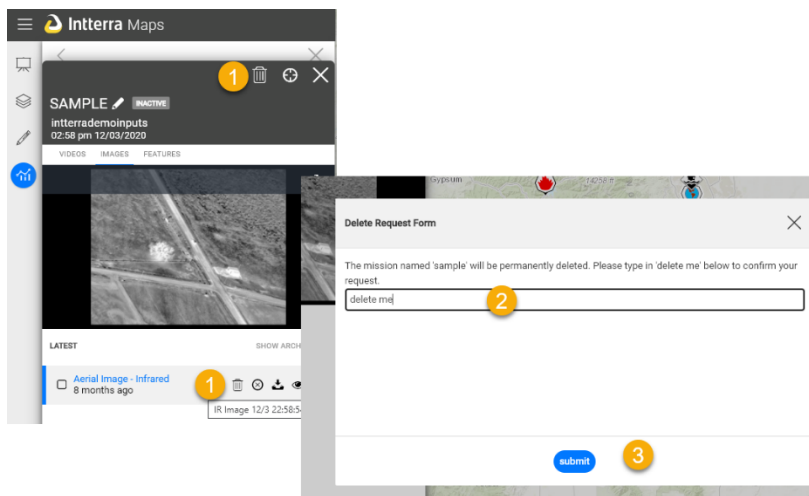
Rename a Mission



1. Select edit
2. Rename - Text can contain spaces and special characters not permitted in the transfer process
3. Save

NOTE: The products associated with the mission and are **NOT** renamed. Products that are downloads with contain the original name. If its importance for downloaded products to have a new name, please delete the mission and resubmit the products with the new name.

Delete a Mission or Product



1. Click on the trashcan icon - either for the mission or for a product.
2. Confirm the deletion by typing **delete me**.
3. Click on **Select**.

Note: If a mission is deleted and then a product is loaded with the same mission name as the deleted mission, all the products we be visible again. To prevent this from happening, either use a

different name or delete the products first.

Note: This tool does not make any changes to the files in the S3 bucket.

Data Retention

The data will be visible in the tool for 60 days and then permanently archived. The number of days is configurable by Intterra per client request.