

Deploy Incident Maps To Mobile Devices Using QR Codes How To

Description

The **Avenza Maps** app has become an important tool for incident personnel because it enables them to view GPS-enabled incident maps on their Android and iOS mobile devices, even when WiFi or cellular data service are not available.

Mobile maps are especially useful when visibility is poor, or when personnel are unfamiliar with local features and travel routes, or are inexperienced navigating by reference to paper maps.

QR (Quick Response) codes facilitate efficient deployment of incident maps to mobile devices.

Lesson Objective

Understand five tasks necessary to deploy incident maps to mobile devices using QR codes.

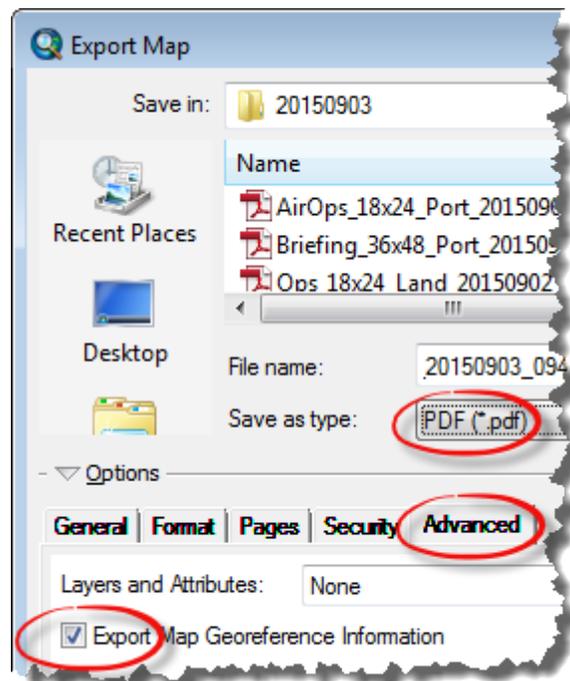
1. Create incident maps that are compatible with the Avenza Maps app.
2. Post mobile maps to a NIFC FTP folder.
3. Create QR codes that reference the URL of mobile maps, or of mobile map folders.
4. Distribute QR codes so personnel can retrieve and install mobile maps.
5. Use Avenza Map's in-app QR code scanner to install mobile maps.

Task 1

Create incident maps that are compatible with the Avenza Maps app by exporting the maps in a **georeferenced PDF format**.

Follow these steps to complete this task.

1. Create incident maps using accepted tools, techniques, and standards.
2. Export incident maps in a georeferenced PDF format by selecting **PDF** as the file type, and by placing a check mark in the **Export Map Georeference Information** checkbox on the **Advanced** tab of the **Export Map** dialog, as shown at right.

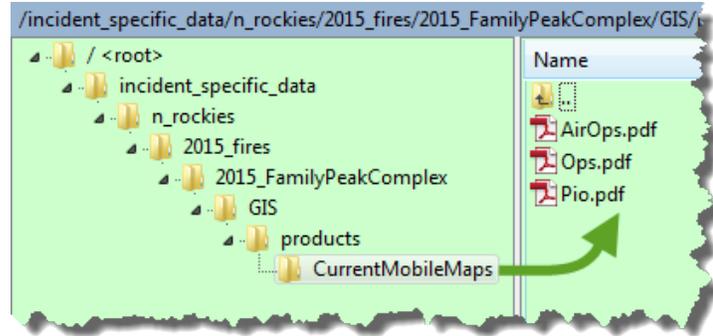


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Task 2

Post mobile maps to a NIFC FTP folder. The NIFC FTP site is the approved location for posting and retrieving mobile maps.

Depending on your agency's policy, Google Drive, DropBox, or other locations may also be viable options for a mobile map repository, as long as all incident map products and data are being posted to their primary repository at NIFC FTP. Be aware that QR code functionality at non-NIFC locations may differ from that described in this guidance.



Follow these steps to complete this task.

1. Use WinSCP or FileZilla to connect to the incident's NIFC FTP directory tree.
2. Create a **CurrentMobileMaps** folder within the incident's **Products** folder, as illustrated above.
3. Upload each period's incident maps to that period's date-stamped **Products** folder.
4. Then, upload each period's subset of maps appropriate for mobile use to the **CurrentMobileMaps** folder, and re-name them with a simplified name that persists from one period to the next. An example workflow for a single map product might look like this.
 - The **Pio_11x17_Land_20150903_0935_FamilyPeak_MTLCF5061.pdf** map would be uploaded to the incident's **20150903 Products** folder with no name change.
 - The same map would then also be uploaded to the **CurrentMobileMaps** folder, and its name changed to **Pio.pdf**.
 - That Pio map would be replaced by the next period's public information map that would be renamed to "Pio", thus retaining a consistent map name for the duration of the incident even though the underlying map content would change with each period. Maintaining a persistent name for a mobile map product, period after period, enables a single QR code to reference that product for an entire incident. Also, a simplified name is easier for users to read at a glance on their small mobile device screens.

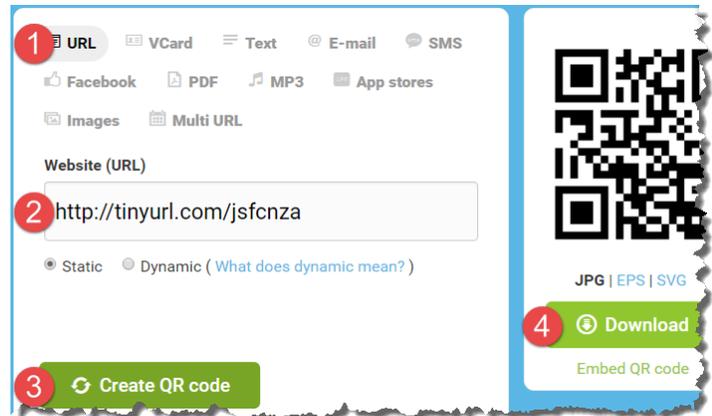
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Task 3

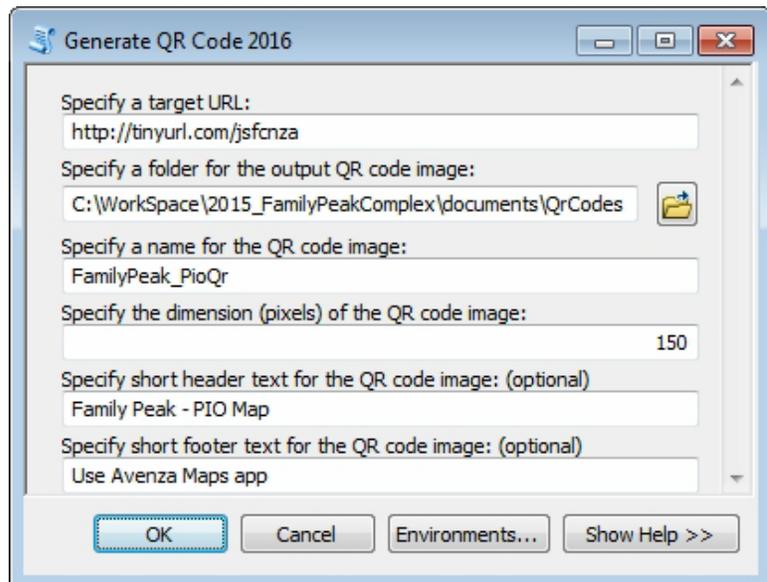
Create QR codes that reference the URL of mobile maps, or of mobile map folders. A Quick Response (**QR**) code is a type of barcode consisting of an array of black and white squares, typically used to encode URLs, or other information. Scanning a QR code that contains an embedded URL is a convenient way to access online content because users don't have to manually enter a lengthy or complex URL from their device keyboard.

Follow these steps to complete this task. Use <http://www.qr-code-generator.com/> as an example of many free online QR code generators.

1. Select the **URL** option.
2. Paste a mobile map's URL where indicated.
3. Click **Create QR code**.
4. Click **Download** to retrieve, unzip, and file the QR code.



Another option for creating QR codes is the **GenerateQrCode_2016** toolbox script (an example dialog below right) that can be run directly from within ArcGIS, and has the added advantage of being able to include header and footer text as part of the QR code, as shown below left.



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A consideration when creating QR codes is whether to embed them with a long URL, or a short URL. Longer URLs result in more complex, finer-grained QR code patterns that may be more difficult to scan reliably. Shorter URLs result in simpler, coarser-grained QR codes that may be easier to scan.

A full-length URL looks like this, and its complex QR code is shown below left.

https://ftp.nifc.gov/public/incident_specific_data/n_rockies/2015_fires/2015_FamilyPeakComplex/GIS/products/CurrentMobileMaps

The same URL shortened with TinyURL looks like this, and its simpler QR code is shown below right. <https://tinyurl.com/ydz7q5dl>



There are two ways to achieve shorter URLs.

- Post maps to locations with a shorter full-length URL.
- Shorten long URLs using TinyURL, BitLy, etc.



Another consideration is deciding whether a QR code should point to a folder of maps, or to an individual map. Two strategies that could be employed with the **CurrentMobileMaps** folder scenario from Task 2 are described here.

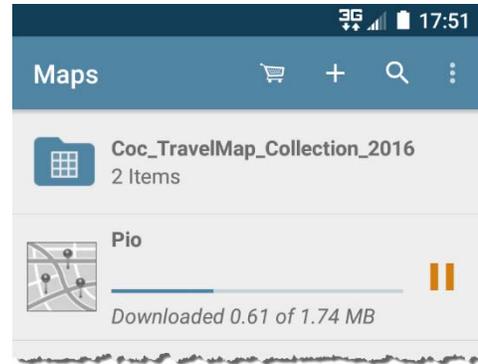
1. Create a single QR code that points to the **CurrentMobileMaps** folder. Users scan the QR code, and then select which of the folder's map(s) they want to download and install to the Avenza Maps app.
 - **Pro** - Only one QR code is needed, as it points to the folder that contains all of the available mobile maps.
 - **Con** - Selecting a map from the folder may result in users having to perform several intermediate steps before the map becomes available in Avenza Maps. For instance, the map may open within a browser, or within a PDF viewer, and the user would then have to redirect the map to the Avenza Maps app using an "Open In..." or "Open With..." option.

A screenshot of a mobile file browser interface. At the top, it shows signal strength, battery, and the time 17:42. Below that is a table with two columns: 'Name' and 'Last modified'. The table lists a 'Parent Directory' with a back arrow icon, and three PDF files: 'AirOps.pdf', 'Ops.pdf', and 'Pio.pdf', all with a date of '16-Apr-2016 09:58' and a size of '9', '2', and '1' respectively.

Name	Last modified	S
Parent Directory		
AirOps.pdf	16-Apr-2016 09:58	9
Ops.pdf	16-Apr-2016 09:58	2
Pio.pdf	16-Apr-2016 09:58	1

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2. Create multiple QR codes that each point to an individual map within the **CurrentMobileMaps** folder.
 - **Pro** - Scanning the QR code will download the map directly into the Avenza Maps app, as shown at right.
 - **Con** - Managing several different QR codes (one for each map) could create some confusion about which QR code is which, or could take up additional space in documents or on bulletin boards. Fortunately, the ability to brand QR codes with descriptive header and footer text using the **GenerateQrCode_2016** toolbox script simplifies QR code management.

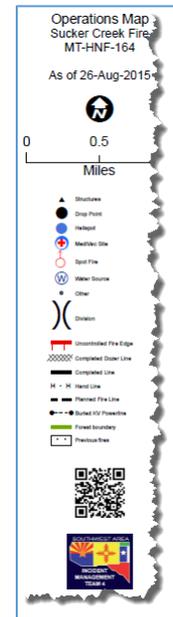


Task 4

Distribute QR codes so personnel can retrieve and install mobile maps. Once created, QR codes can be distributed on hardcopy maps, in printed materials, on bulletin boards, and at public sites.

Follow these steps to complete this task.

1. Include a companion QR code in the legend of each hardcopy map product for which there is a corresponding mobile map, as in the example at right. Doing so will facilitate retrieval of a hardcopy map's digital equivalent.
2. Include relevant QR codes in the daily Incident Action Plan (IAP). Anyone receiving an IAP could then retrieve current mobile maps, if desired.
3. Post relevant QR codes near briefing areas, on camp bulletin boards, and at public information sites.
4. Post relevant QR codes in online content so remote users can retrieve mobile maps.



Task 5

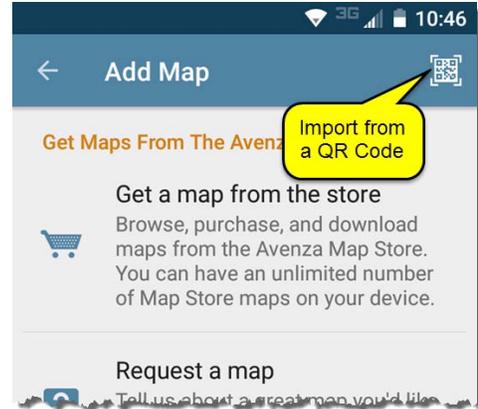
Use Avenza Map's in-app QR code scanner to install mobile maps. Avenza Map's in-app QR code scanner facilitates download and installation of incident maps whose URL has been encoded in a QR code.

Procedures and icons may vary somewhat between Android and iOS devices. The examples illustrated here are from an Android phone.

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Follow these steps to complete this task.

1. Open the Avenza Maps app on an Android or iOS mobile device.
2. Press the “+” icon on the **Maps** page to download or import a map.
3. Press the **QR code icon** on the **Add Map** page, as shown at right.
4. Scan a map’s QR code, and accept its installation.
Be patient while the map downloads, processes, and tiles its content.



The map will download directly to Avenza Maps in situations where the QR code encodes an individual map’s URL.

If the QR code encodes the URL of a folder containing maps, users will have to select a map from among those in the folder, wait for it to open in a browser, or in a PDF viewer, and then redirect it to Avenza Maps using an “Open In...” or “Open With...” option.

Other mobile map considerations

Several other considerations for mobile map creation and deployment include these items.

1. Mobile map file size.
2. Mobile map dimensions.
3. Availability of WiFi or cellular data service.
4. How to obtain the URL of a mobile map or folder.

Mobile map file size – A map’s file size affects download speed. Opportunities to decrease file size include:

1. Minimize the use of raster data.
2. Minimize the use of transparency.
3. Use the **IsRasterizing.py** Python snippet to identify rasterizing layers in ArcMap’s TOC.
4. If possible, do not include a rasterizing layer within a grouped data layer. All the layers within a group containing a rasterizing layer will be rasterized during export.
5. Place rasterizing layers as low in the Table of Contents as possible. All the layers below a rasterizing layer will be rasterized during export.

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6. Try “Adaptive” and “Deflate” **Export** settings to see which one produces smaller files. Results can vary from one map to the next.
7. Adjust the “Output Image Quality (Resample Ratio)” **Export** setting downward to reduce file size. Unfortunately, this will also reduce the resolution of a map’s raster content.
8. Use Adobe Pro or other software, to “Optimize” PDF files.

Mobile map dimensions – A map’s dimensions affect the amount of time it takes to process and tile the map’s content. All other things being equal, a map with larger dimensions will take longer to process and tile than a map with smaller dimensions because it has more tiles.

Availability of WiFi or cellular data service – The typical scenario for downloading mobile maps depends on the availability of WiFi or cellular data service. There are three options when wireless service is not available.

1. Connect an **Android** mobile device to a PC with its USB cable and:
 - Copy/paste mobile map PDF files directly to the device’s **Downloads** folder.
 - Use the **From Device Storage** option to import a map into Avenza Maps.
2. Connect an **iOS** mobile device to a PC with its USB cable and:
 - Set iTunes **Device Preferences** to prevent automatic device sync.
 - Use **iTunes File Sharing** to stage mobile maps.
 - Use the **From iTunes File Sharing** option to import a map into Avenza Maps.
3. Use a “wireless flash drive” (it’s like your personal, portable WiFi access point) to host mobile maps for others.

How to obtain the URL of a map or folder – Both WinSCP and FileZilla only provide URLs from their connection’s entry point forward, so use a browser to obtain the full URL of a mobile map or a mobile map folder. Right-click a NIFC FTP map or folder in a browser and use the right-click context menu to copy that item’s URL to the system clipboard by choosing **Copy link address...** in Chrome or **Copy shortcut** in Internet Explorer.

Job Aids

This guidance refers to several tools or references, as described below.

- The **Avenza Maps app** is available free from the Google Play Store (Android) or the Apple App Store (iOS).
- The **GenerateQRCode_2016** toolbox script and the **IsRasterizing** Python snippet are available in this lesson’s course materials.
- The [FileZilla](#) and [WinSCP](#) are free FTP clients available from online sources.
- [BitLy](#) and [TinyUrl](#) are among many online URL shortening resources.
- [My Passport Wireless Pro](#) and [Connect Wireless Stick](#) are available online.