S1 MOBILE APPLICATION FOR ANDROID 2.3

User Guide for S1 Mobile Version 2.3

Contents

Document Version Control

Date	Doc Version Number	Changes
8/10/15	1.00.00	Document Created, 1.0 application release
9/21/15	1.00.01	Added USFS device installation instructions.
12/14/15	1.01.00	Updated doc with changes in release 1.1
2/2/16	1.01.01	Updated install instructions to include app upgrade info
2/24/16	1.01.02	Replaced broken links in USFS install instructions
3/14/16	2.00	Updated to reflect version 2.0 changes
8/16/16	2.00.01	Updated sections regarding BLM Remedy install request
9/30/16	2.30.00	Updated screenshots to reflect new app color scheme & 2.3 changes

About

The **S1 Mobile** application is a custom application built by the Service First (S1) Mobile GIS team, sponsored by Oregon State Office Bureau of Land Management and Region 6 US Forest Service. The application is designed to extend offline mobile field data collection capabilities not available using commercial ESRI mapping applications and to meet the specific data collection needs of the federal agencies served by the OR/WA Service First Mobile GIS program. It is currently built to run on a mobile device running Android operating system, using the ESRI Runtime Software Development Kit (SDK) framework. It leverages each agency's ArcGIS for Organization site as well as their internal ArcGIS Server deployments to distribute and collect enterprise geographic information systems (GIS) information via agency field personnel.

Because agency field personnel operate most commonly in remote areas with no network access, this application's emphasis is on the display, collection & update of geospatial data and attributes with no network availability. Data is downloaded and cached on device, edits can be uploaded to servers when network connectivity is available & it is most convenient for field personnel.

For a full list of application capabilities, or application installation instructions, See the Application Capabilities or Installation sections.

For more background about the application itself, go to the application's website:

https://www.blm.gov/or/gis/mobile/s1mobile/

Launching Application

The application is launched by tapping on the application icon found on the device's list of applications.

Logging into Application

You must be in a connected environment (Wi-Fi or Cellular) when logging into and authorizing the application. Once logged in, those AG4O credentials are then stored on the device; it is only necessary to be in a connected environment when uploading, downloading or synchronizing data, or re-authenticating the application with AG4O.

- To Log in and authenticate the application, choose Agency you work for:

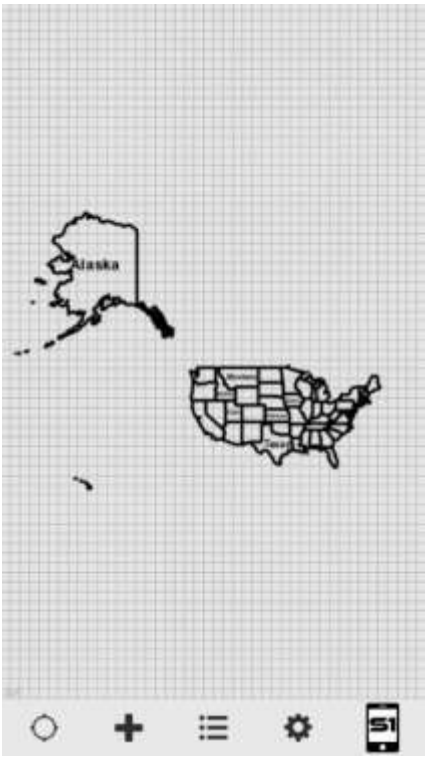
- Enter your agency ArcGIS for Organization (AG4O) user name and password. This is different than your Agency AD user name and password. Tap **Sign In:**

All applications based on the ESRI Runtime SDK must be authenticated with AG4O every 30 days. The application will alert you when this time has passed. Failure to authenticate the application every 30 days may result in reduced application capability until the application is re-authenticated.

Downloading Default Base Map

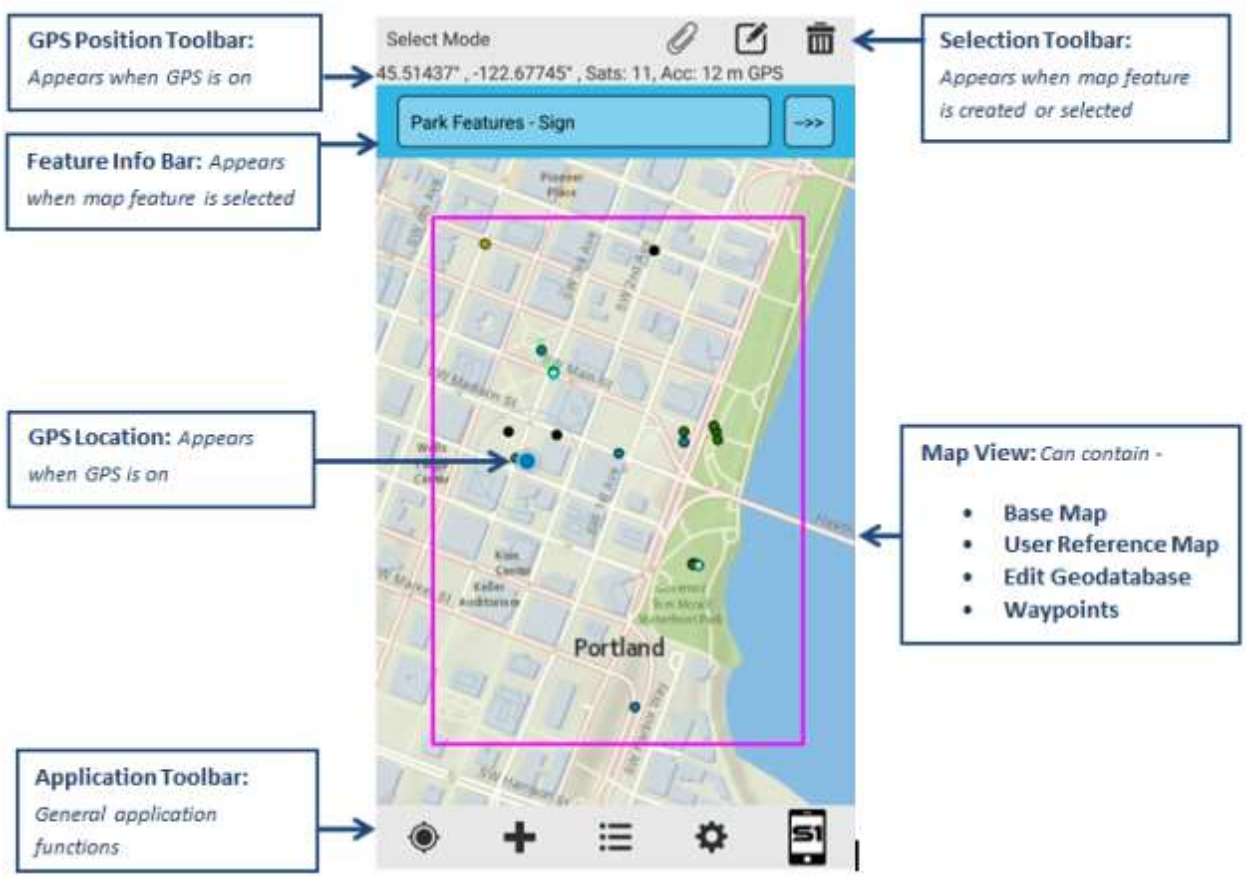
A default base map will be added to the map view after the application is initially authenticated. This is high level base map to orient new users, but most users will prefer to download their own base maps with a greater level of detail for their area of interest.

- When added to map view, Default (High-Level) Base Map appears:



To download your own detailed Base Maps, see Downloading Content.

Application Interface



Application Toolbar

Activate GPS

- Tap GPS Icon to turn on GPS, tap a second time to turn it off
- Once GPS position fix is obtained, location will show on map as a blue dot
- When GPS is turned on, the GPS Position toolbar appears at top of screen, which displays:
    a. Current GPS location coordinates
    b. Number of satellites used in position fix
    c. Estimated accuracy (in meters)
    d. GPS Source/Quality (No Fix, GPS, DGPS, RTK)

- GPS location coordinates are displayed in decimal degrees WGS84 by default, but can be changed to other coordinate systems by tapping on the GPS Position toolbar and selecting another coordinate system from the list; this can also be changed in S1 Options.

- Estimated accuracy is displayed to a 68% confidence interval, can be changed to display estimated accuracy 95% confidence interval in S1 Options. The default accuracy units are metric, but this can also be changed in S1 Options.
- It is advised to set your device's Android Location setting to **GPS only** for the highest possible spatial location accuracy. The application will check when this tool is activated and alert you if the device is set to any other Android Location setting.
- It is possible to connect an external, high accuracy GPS receiver to provide location information to the app instead of using the device's internal GPS. For more information on this topic, see External Bluetooth GPS Receiver Support section.

Collect Features

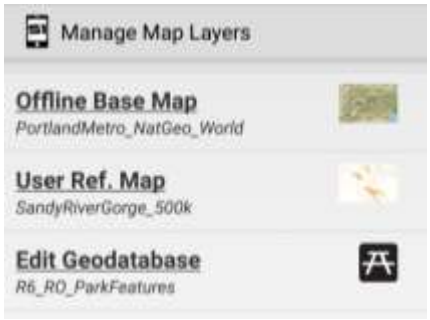
- Tap to capture new map features
- Choose from:

a. S1 Waypoints
b. Layers in the map's current edit geodatabase

- See Collecting New Features section for detailed information about capturing new map features and attributes
- Edit geodatabase can be added to map using the Manage Map Layers tool

Manage Map Layers

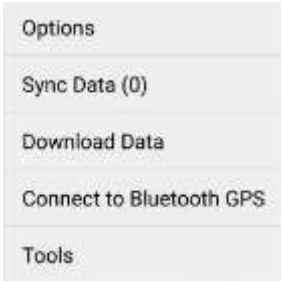
- S1 Mobile displays maps, layers and databases that have been downloaded to the device
- There can be one of each in the application's current map view, see links for more info about each type of data source:
  - Base Map
  - User Reference Map
  - Edit Geodatabase



- This form reports which downloaded layers are featured in the current map view
- Can be used to change one or more of these layers in the current map view
- Can also be used to delete content from local storage of device
- Deleting of Edit GDB requires network connectivity
- See Managing Downloaded Content for more information

Tools/Options Menu

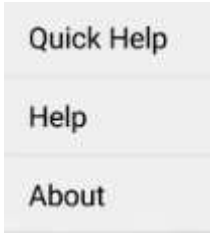
- Tapping the button produces the following menu :



- To learn more about synchronizing edit data, see Sync Data Edits to Server
- To learn more about downloading data to the device, see Downloading Content to S1 Mobile
- To learn more about the application's various tools, see Tools
- To learn more about S1 Application Options, see Application Options

About S1 Menu

- Tapping button produces the following menu:



- Tapping **Help** opens this document in PDF form on the mobile device
- Tapping **Quick Help** opens a Quick Reference PDF guide
- Tapping **About** produces a pop up showing the current installed version number, application description, privacy policy and end-user license agreement (EULA):

Downloading Content

The S1 Mobile application can download and store base maps, user reference maps and edit geodatabases to the mobile device, so that the user of the application can interact with maps and collect data when in areas of limited or no connectivity.

Base Maps

This section describes how to obtain Base Maps for offline consumption with the S1 Mobile application. Base Maps, as the name suggests are the foundational map layer of the S1 Mobile application. These are multi-scale tiled image cache packages (.tpk), which quickly display image tiles appropriate for the current map scale. They are downloaded to mobile devices over Wi-Fi or cellular networks or can be manually copied ("side loaded") to a mobile device via Windows Explorer.

Base Maps are typically authoritative reference maps, and can be sourced commercially (ESRI ArcGIS.com) or produced and distributed by the BLM or USFS. S1 Mobile application can store many Base Maps on a device at a time, and the user can switch between them to set the appropriate Base Map for their current viewing needs.

S1 Mobile application immediately downloads a high level "wire frame" Default Base Map when the application is first installed. Unlike other user-downloaded Base Maps, the Default Base Map cannot be deleted from the device.

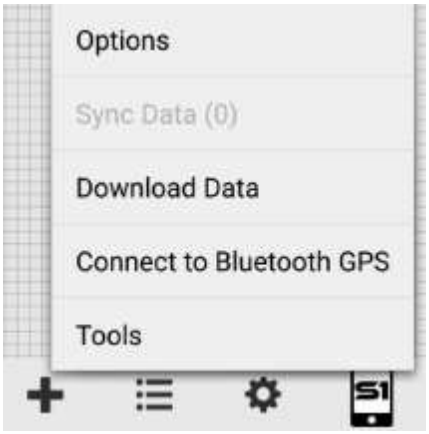
Assumptions for Downloading Base Maps:

- S1 Mobile Application open on Android device
- A 4G or Wifi network connection

Download ESRI Base Maps

- Tap **Tools/Options** button

- Tap **Download Data**

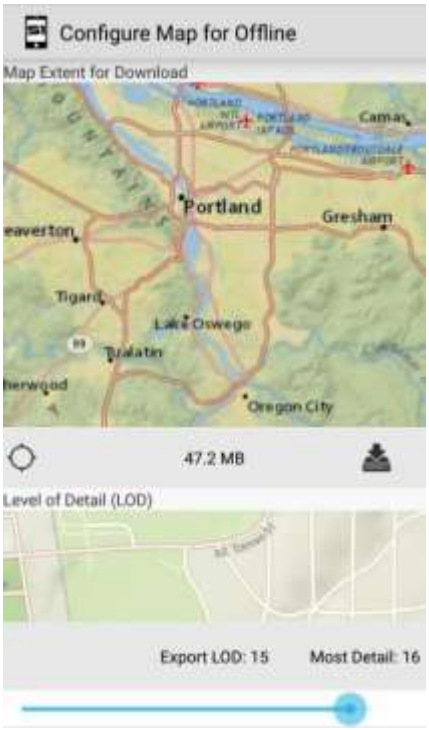


- Tap **Download ESRI Base Map**

- Choose a Base Map from the list of available ESRI Base Maps

- You can have multiple downloads on a device from same ESRI Base Map, each with their own different extents and zoom levels. Add a unique name to describe this download.

- Use top map view to set the maximum map extent, use slider on bottom to set max level of detail (LOD). Very large extents may constrain your ability to download a deep level of detail. The application will reported estimated download size as you adjust the LOD slider.



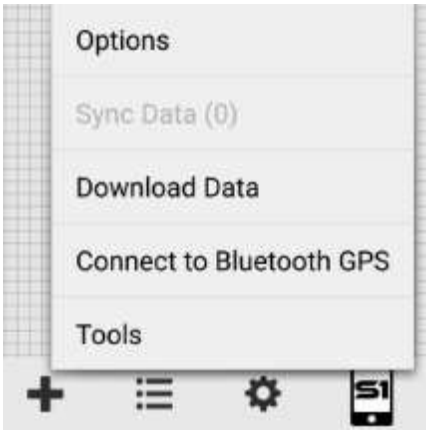
- Tap download button to initiate download.

- Track the download progress in the notification panel. When download is complete, map is automatically added to map view as the current Base Map.

Download Agency (BLM or USFS) Base Map

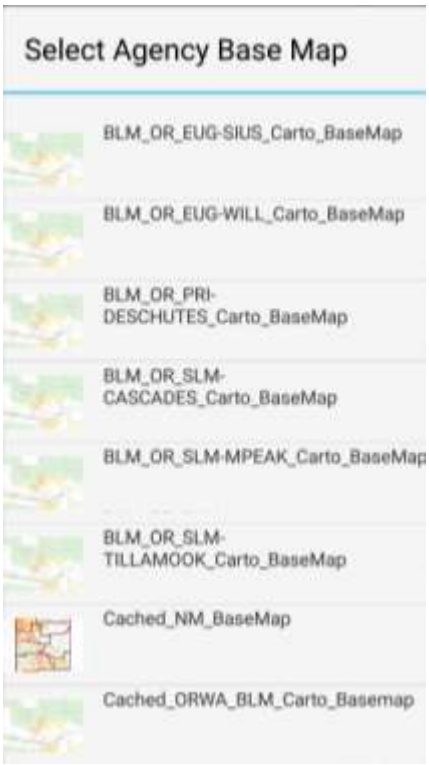
- Tap **Tools/Options** button

- Tap **Download Data**



- Tap **Download Agency Base Map**

- Choose a Base Map from the list of available Agency Base Maps. If the selected content is a pre-configured Base Map in tile package (.tpk) format, the download will begin immediately. If the selected content is a tiled mapping service Base Map, continue with instructions below to set the extent and zoom level.

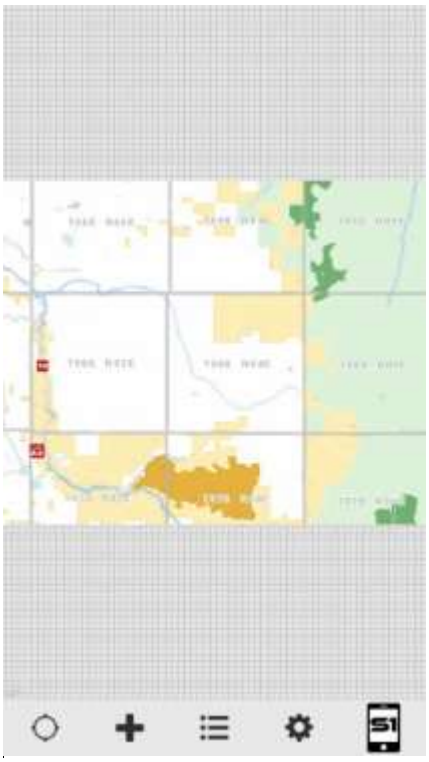


- You can have multiple downloads on a device from same agency Base Map, each with different extents and zoom levels. Add a unique name to describe this download.

- Use top map view to set the maximum map extent, use slider on bottom to set max level of detail (LOD). Very large extents may constrain your ability to download a deep level of detail. The application will reported estimated download size as you adjust the LOD slider.

- Tap download button to initiate download

- Track the download progress in the notification panel. When download is complete, map is automatically added to map view as the current Base Map.



User Reference Map

In S1 Mobile, users can add a user reference map to display on top of the existing base map. This user reference map can be either a multi-scale ESRI tile package (.tpk) or a single geo-referenced GeoTIFF image file. User reference maps can be shared and downloaded to mobile devices via ArcGIS for Organization (AG4O) over Wi-Fi or cellular networks. They can also be manually copied to a mobile device via Windows Explorer.

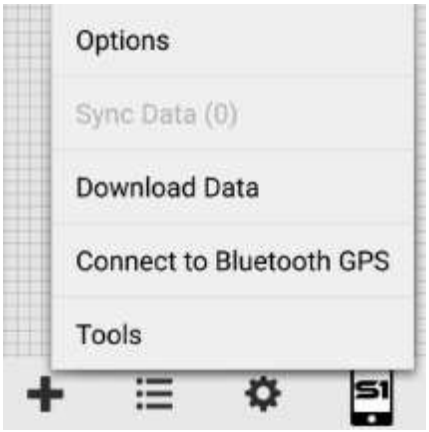
Downloading User Reference Map to Device

Assumptions:

- S1 Mobile application open on Android device
- A 4G or Wi-Fi network connection
- User Reference Maps uploaded to AG4O and shared with a group you are a member of

- Tap **Tools/Options** button

- Tap **Download Data**



- Tap **Download User Reference Map**

- A list of AG4O groups that you are currently a member of will appear. Tap on the group that the desired User Reference Map is a part of.

- A list of User Reference Map will appear, tap on the one that you wish to download.

- Download will begin. When download reaches 100%, the layer is added to the map view as the current User Reference Map.

Copy User Reference Map to Device via Side Loading

While sharing reference maps via AG4O is often the easiest way to distribute user generated reference data to multiple devices, if the map content is very large or network connectivity is unreliable, it can take a long time to download to a device. An alternative is to instead connect the device to a PC via USB cable and to use Windows Explorer to side load the user reference maps directly onto the device's SD card.

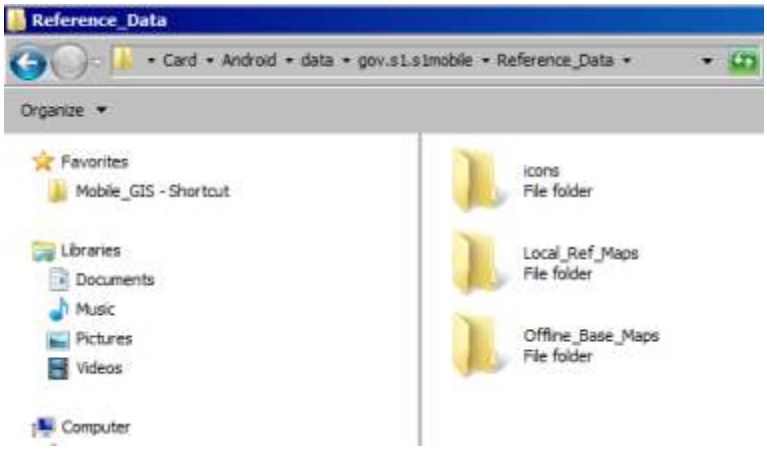
Assumptions:

- Android Device with SD Card installed
- S1 Mobile application installed
- USB cable
- Reference Map already created

Copy User Reference Map to Mobile Device

- Using Windows Explorer, navigate to the network location where the tile package or geo-referenced GeoTIFF resides. Right click on the file and choose Copy.
- Connect Device to computer via USB cable.
- Using Windows Explorer, navigate to the following directory on your connected Android device.

…\Card\Android\data\gov.s1.s1mobile\Reference_Data



- Double click on the folder Local_Ref_Maps to open it. This is the directory where all downloaded and side loaded User Reference Maps must reside.
- Click on Organize -> Paste to copy/paste the file into this directory.

Add User Reference Map to Application Map View

When downloading from AG4O, the User Reference Map is automatically added to the map view when the download has completed. If data is side loaded, one must manually add the User Reference Map to the map view.

The S1 Mobile Manage Map Layers button allows you to add/change one of these to a different reference map that is currently stored on the device. See Managing Downloaded Content for more information.

Download Edit Geodatabase (GDB)

Assumptions:

- S1 Mobile application open on Android device
- A 4G or Wifi network connection
- Published Feature Service with **Sync** capability enabled
- User has edit rights to access to feature service (if it is secured)

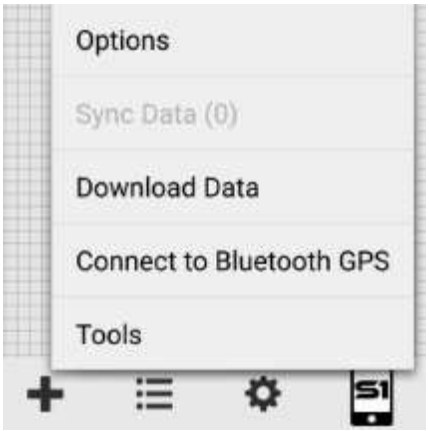
About Edit GDB Extent

Each edit GDB has a maximum extent; no features can be collected beyond the area set by this extent. The extent is set when the edit GDB is downloaded to the device.

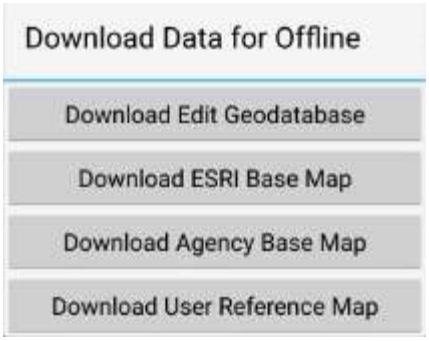
Downloading Edit GDB to Device

- Launch S1 Mobile application, zoom map view to desired maximum extent. This will define the maximum data collection area for the downloaded data set.
- Tap **Tools/Options** button

- Tap **Download Data**

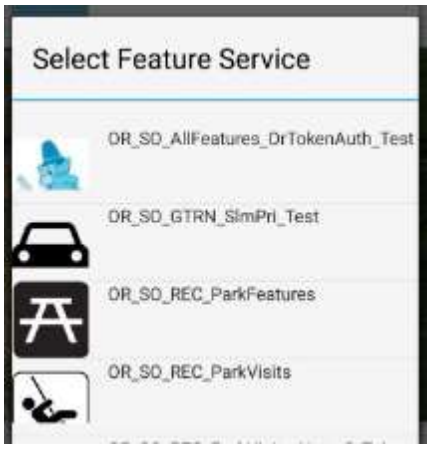


- Tap **Download Edit Geodatabase**

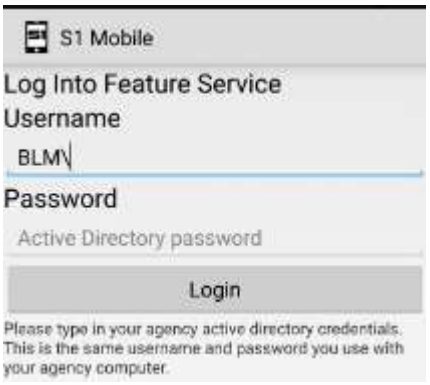


- A list of AG4O groups that you are currently a member of will appear. Tap on the group that the desired feature service to be downloaded is shared with.

- A list of Feature Services will appear, tap on the one that you wish to download into an Edit GDB.



If the Feature Service resides on internal Agency ArcGIS 10.3 servers: enter Agency Active Directory (AD) credentials. User name credentials should be entered as: **BLM\username** (for BLM) or **DS\username** (for USFS), using your Agency user name and enter your Windows AD password. Tap **Login** to submit request.



If the Feature Service is an ESRI hosted Feature Service, no log in credentials are required.

- Set the extent of the edit geodatabase by zooming and panning the map view. All features that fall within the extent of the current map view will be downloaded to the device.

- When extent is set, tap the **download button** to begin the download process.

Download will begin. While the download is underway, a progress circle will display on the toolbar.

Edit GDB layers are added to the map view when download is complete. The length of this process depends on the size of the extent downloaded and the number of features present in the download area extent. A pink rectangle will document the maximum extent of this edit GDB. No data can be collected outside this extent.

- You can start collecting features into this database by tapping the **Collect Features** button.

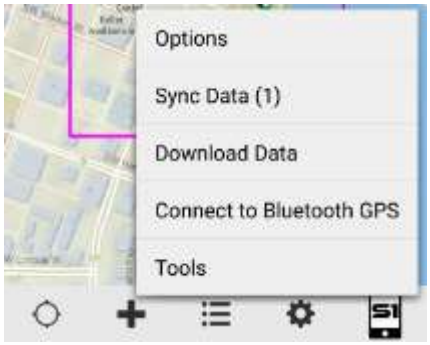
Sync Data Edits to Server

After features have been collected or modified, edits can be sync'd back to the server when the device has network connectivity.

Synchronization requires either a 4G or a WiFi connection; 3G or slower connections cannot support synchronization. It is strongly advised syncing occur on a reliable WiFi connection whenever possible.

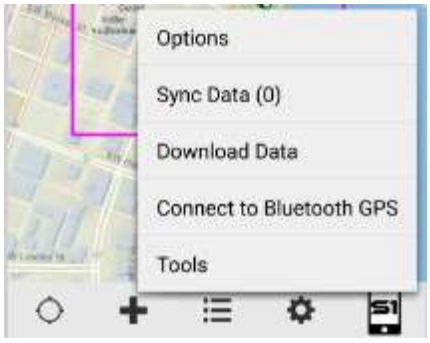
- Tap **Tools/Options** button

- To sync changes, tap **Sync Data.** The number of edits to be synchronized will be displayed next to Sync Data.



- The duration of the sync process will be determined by network connectivity and the number of records that are being synchronized. While the synchronization process is underway, a progress circle will display on the toolbar.

- When the process has completed, the progress circle will disappear and the following message will appear at the bottom of the screen: **Sync Completed without Errors**.
- After synchronization, the number of changes to be sync'd resets to zero.

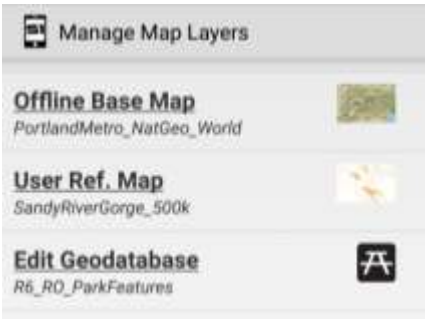


Managing Downloaded Content in Map View

The application map view can support the display of a base map, a user reference map and an edit geodatabase. Users can switch out one or more of these with other locally stored base maps, user reference maps or edit geodatabases using **Manage Map Layers**. User Reference Maps and Edit GDB must fall with in the current Base Map extent in order to be added to the Map View.

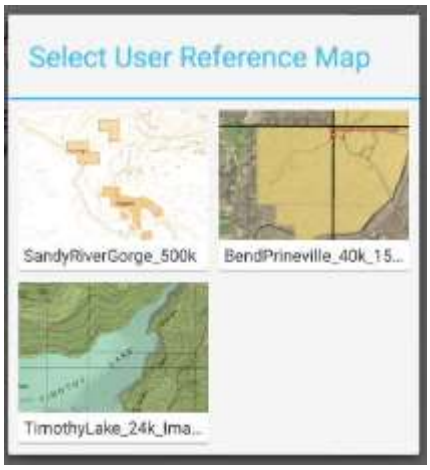
- Click on the **Manage Map Layers** icon.

The current map content is listed on the form. To change to a different content, tap the thumbnail to the right of that map content.



Switch Current Content in Map View

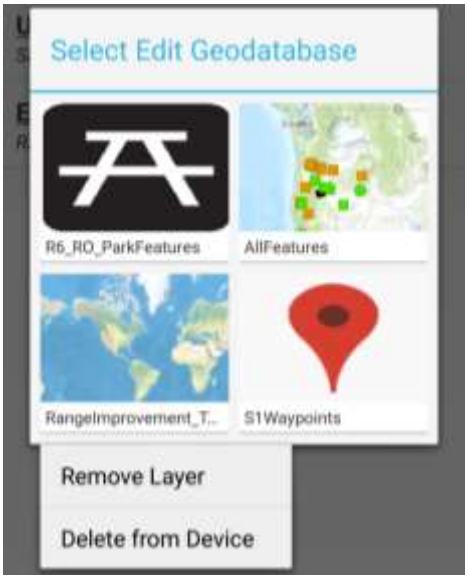
- Tap the thumbnail to the right of Base Map, User Reference Map, or Edit Geodatabase. A list of all Base Maps (tile packages) or User Reference Map (tile packages & geo-referenced images) or Edit Geodatabases stored on device will appear as thumbnails.



- To add content to your map, tap its thumbnail. User Reference Maps draw on top of the Base Map. Edit Geodatabases draw on top of all other map content.
- In order to add User Reference Maps or Edit GDB to your current map view, they must be within the extent of the current Base Map. If they are not, they cannot be added to the current map view without first changing the current Base Map.
- In order to collect or sync edit data in an edit geodatabase, it must be present in the map view.

Remove Layer from Map and Delete from Device

- To remove a layer from the current map view, long tap on the thumbnail and choose **Remove Layer**. This only removes it from the current map view. It does not delete it from the device.



- To permanently remove a layer from the device, long tap on the thumbnail and choose **Delete Layer from Device**. This will remove it from the map view (if necessary) and permanently delete the layer from the device memory.
- If this is an edit geodatabase, you must have network connectivity prior to deleting an edit GDB.

- If this is an edit geodatabase, all edits should be sync'd prior to deleting the geodatabase from device. If not, edits will be lost.

Collecting New Features

Assumptions:

- Edit GDB has been downloaded to device covering the desired data collection area extent
- Edit GDB is set as the current Edit Geodatabase in Manage Map Layers

To start collecting new map features:

- Tap the **Collect Features** button

- Choose the layer to collect a new feature. Your data collection workflow will be dictated by geometry type of layer you choose here

Collecting New Point Feature via GPS

- If not already activated, turn on GPS by tapping **GPS** button
- Wait until strong position fix before proceeding
- Tap the **Average GPS** button to capture an averaged GPS position for your feature

- Averaging status appears at the bottom of the screen in the **Position Capture Status** bar, application captures # of vertices based on S1 Application Options settings.

On tablets, the attribute data entry pane will already be visible on screen; attribute data entry can occur simultaneously with geometry capture. On smaller devices, the attribute view must be initiated by tapping the **Attribute View Toggle** button. This button allows the user to switch back & forth between map & attribute view on smaller devices, or to minimize the attribute view on tablet sized devices.

- Tap **Commit Edit** button on Edit Toolbar to save geometry & attributes data entry

Collecting New Point Feature via Digitizing/Draw on Screen

- If GPS is activated, turn off GPS by tapping **GPS** button
- Tap on screen at location where point is to be created, red dot will appear

On tablets, the attribute data entry pane will already be visible on screen; attribute data entry can occur simultaneously with geometry capture. On smaller devices, the attribute view must be initiated by tapping the **Attribute View Toggle** button. This button allows the user to switch back & forth between map & attribute view on smaller devices, or to minimize the attribute view on tablet sized devices.

- Tap **Commit Edit** button on Edit Toolbar to save geometry & attributes data entry

Collecting New Line or Area Feature via GPS

- If not already activated, turn on GPS by tapping **GPS** button
- Wait until strong position fix before proceeding

GPS Streaming

- Tap the **Begin Streaming** button to start recording GPS positions for your feature and start moving

- Feature vertices will be captured based on interval settings specified in S1 Application Options, total number of positions recorded will be displayed in the **Position Capture Status** bar

- To temporarily suspend capturing vertices via streaming, tap the **Pause Streaming** button
- To optimize application performance, do not capture more than 5,000 streaming positions in a continuous streaming session

On tablets, the attribute data entry pane will already be visible on screen; attribute data entry can occur simultaneously with geometry capture. On smaller devices, the attribute view must be initiated by tapping the **Attribute View Toggle** button. This button allows the user to switch back & forth between map & attribute view on smaller devices, or to minimize the attribute view on tablet sized devices.

- After line or area is fully captured, tap **Commit Edit** button on Edit Toolbar to save geometry & attributes data entry

GPS Averaged Vertex

- Stand at the start or the line feature or edge of the area feature, then tap **Average GPS** button to capture first vertex

- Averaging status appears at the bottom of the screen in the **Position Capture Status** bar, application captures # of vertices based on S1 Application Options settings

- When averaging is complete, move to the next location along the line or area perimeter; tap **Average Vertex** button to capture another vertex at this location.

On tablets, the attribute data entry pane will already be visible on screen; attribute data entry can occur simultaneously with geometry capture. On smaller devices, the attribute view must be initiated by tapping the **Attribute View Toggle** button. This button allows the user to switch back & forth between map & attribute view on smaller devices, or to minimize the attribute view on tablet sized devices.

- After line or area is fully captured, tap **Commit Edit** button on Edit Toolbar to save geometry & attributes data entry

GPS Toggle between Stream & Averaged Vertex

It is possible to toggle data collection between GPS streaming and GPS Averaged Vertex when collecting lines or areas. As an example:

- Start collecting line or area via GPS Streaming (**Begin GPS Stream** button)
- To switch into Averaged Vertex mode, tap **Pause GPS Stream**, move to location to place Averaged Vertex
- Tap **Average Vertex** button and collect position
- To return to GPS Streaming, tap **Begin GPS Stream** button again
- Finish spatial and attribute data collection as you would on other collection work flows

Collecting New Line/Area Feature via Digitizing/Draw on Screen

- If GPS is activated, turn off GPS by tapping **GPS** button
- Tap on screen at location where line or area is to begin, red dot will appear
- Tap again on screen to place second vertex location, second dot will appear and line connects two vertices
- Continue tapping on screen to draw line or area feature

On tablets, the attribute data entry pane will already be visible on screen; attribute data entry can occur simultaneously with geometry capture. On smaller devices, the attribute view must be initiated by tapping the **Attribute View Toggle** button. This button allows the user to switch back & forth between map & attribute view on smaller devices, or to minimize the attribute view on tablet sized devices.

- After line or area is fully captured, tap **Commit Edit** button on Edit Toolbar to save geometry & attributes data entry

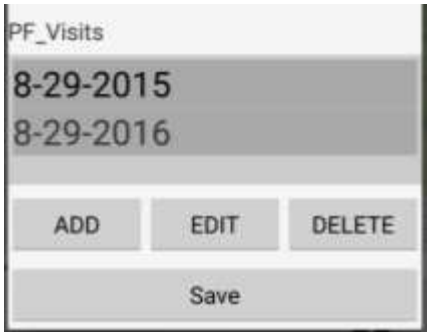
Repeating Attributes

When collecting many features that share the same set of attribute values, it may be beneficial to enable the **Repeat Attributes** option, available at the bottom of the attribute data entry form. This capability is turned on once per GDB layer, and will persist from session to session for GDB layer until it is turned off. When enabled, subsequent new features collected into this same layer will have the attributes pre-populated from the previously collected feature. Unique attribute value fields (primary keys, GUID values, editor tracking fields, etc) are never repeated. Attributes can be changed before saving subsequent features. Repeat Attributes is turned off by default.

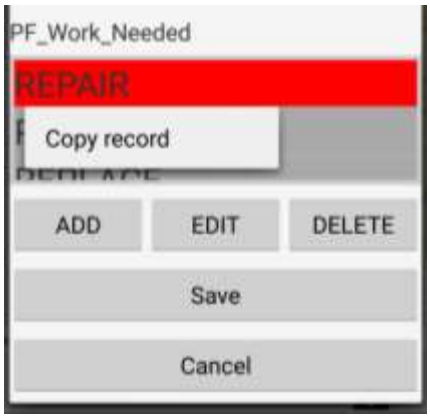
Related Records Data Entry

If the feature service supports related tables, S1 Mobile application can create, edit & delete related records into its offline edit GDB. The application supports the following relationship types: feature to feature, feature to table, table to table & relates of relates. Relationships must be constructed using both a GLOBALID or GUID field as the primary key field type and a GUID field as the foreign key field.

When a relationship exists between two tables, a list box will appear on the parent feature class/table's attribute edit form for each relationship class. The name of the relationship class appears as a title above the list box. Existing related records appear inside the list box.



- New related records can be created by tapping **Add**
- Existing related records can be queried or edited by highlighting the related record in question and tapping **Edit**
- Existing related records can be queried or edited by highlighting the related record and tapping **Delete**
- Existing related records can be copied or duplicated by long tapping on the record to be duplicated and choosing **Copy record**; doing so will create a duplicate record in the related table with the same attributes as the original, attributes can be modified on the duplicated record prior to saving.



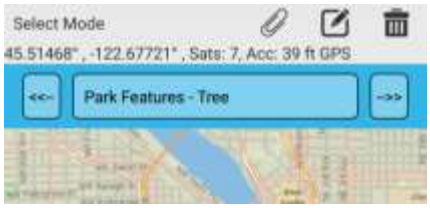
Editing Existing Features

Assumptions:

- Edit GDB has been downloaded to device covering desired data collection area
- Edit GDB is set as the current Edit Geodatabase in Manage Map Layers
- There are existing features in this Edit GDB to edit

To edit an existing feature it must be selected:

- Tap on screen to select a map feature. A feature's symbol, when selected is highlighted in the map view.
- A blue Feature Info bar will appear listing the name of the selected feature.
- If multiple features were selected at the same time, swipe the blue feature bar left or right until the desired feature is selected



- Tap the blue Feature Info bar to display the Feature Info pop up

- The feature Info pop up can be closed using the device's back button. Feature remains selected even after pop up is closed.
- Once feature is selected, tap the **Edit Feature** button on the Selection Toolbar to begin editing the selected feature

Edit Mode Toolbar

While in edit mode, the Edit Toolbar will appear on screen:

 Submit Edit

 Attribute View Toggle

 Cancel Edit

 Delete Feature

Editing Feature Geometry

Geometry edits are made on a single selected feature at a time. All edits must be saved via **Submit Edit** button in order to be made permanent; prior to saving changes can be rolled back using the **Cancel Edit** button.

Editing Point Geometry

The feature will be automatically selected on screen via red dot while in edit mode.

Via GPS

- If not already activated, turn on GPS by tapping **GPS** button
- To change its location to the current GPS location, tap the **Average GPS** button

- The red dot will move to the current GPS location after averaging its position
- To edits any attributes, follow instructions below

- To commit the change and stop editing the feature, tap the **Submit Edit** button

Via Digitizing Manually on Screen

- To move the feature's location, tap that location on screen.
- The red dot will move to that location.
- To commit the change and stop editing the feature, tap the **Submit Edit** button

Editing Line or Polygon Geometry

The feature will be automatically selected on screen and the individual vertices are displayed as large black dots. In edit mode, users can reshape the feature using GPS or by dragging vertices around the map using a finger.

Via GPS

- If not already activated, turn on GPS by tapping **GPS** button
- In order to reshape the line or polygon feature using GPS, first tap the vertex where the reshaping is to be initiated from, a red dot will appear there when it has been selected.

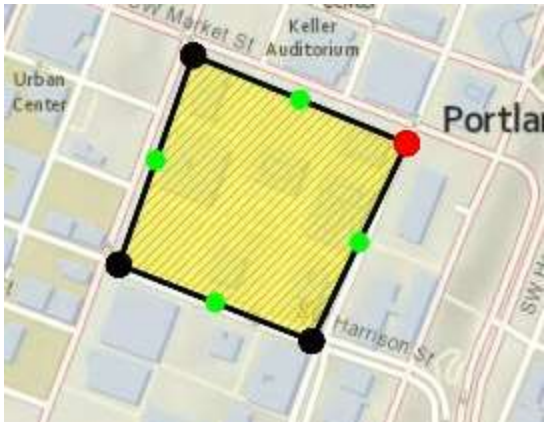
- To begin reshaping the line or polygon, tap the **Begin Streaming** button to start recording updated GPS positions and start moving

- As you move, the existing feature will adjust to match the updated GPS positions
- Just like new data capture, it is possible to pause capture and to capture using averaged vertices, see Collect New Line or Area via GPS for options
- To end reshaping the feature and commit the changes, tap the **Submit Edit** button

- If reshaping is occurring in the middle of a feature, the end of the reshape line will snap back to the next closest vertex in the feature being edited

Via Digitizing Manually on Screen

- The existing vertices will be shown on screen as large black dots. To move a vertex, tap and drag it to a new location on the map.



- The vertex will move and the feature will automatically reshape itself
- To insert additional vertices, tap and drag the green circle in between two existing vertices to a new location, a new black vertex will appear when you release

- To commit the change and stop editing the feature, tap the **Submit Edit** button

Editing Feature Attributes

- The feature should already be selected and the **Edit Feature** button on the Selection Toolbar should already be enabled, if not do so
- Tap on the **Edit Attributes** button on the edit toolbar to display attribute view, if it is not already visible

- Make any changes necessary then tap **Submit Edit** button to commit the changes
- To delete a selected feature, tap **Delete Feature** on the Selection Toolbar

- To edit the photo attachments associated with the selected feature, see Managing Existing Photo Attachments

Collecting Photo Attachments

Photos can be attached to features of any edit geodatabase that supports feature attachments. Photos can be taken by the device camera and inserted as an attachment or an existing JPEG image on device can be used to create the attachment. There is no limit to the number of photo attachments that can be associated with any one feature, but the more photos taken, the longer uploads will take to process back to the database at synchronization time.

Collecting Photo Attachments

- To capture a photo attachment while collecting a new feature, tap the **Attachment** button

- Tap **Take Pic** to initiate the camera tool or **Browse** to search for existing images on device
- If using Camera, frame subject , snap photo and tap the **Save** button
- If browsing the device, choose an image from the Image Gallery shown on screen
- Repeat process to add as many photo attachments as required
- Thumbnails of the associated photo attachments will display on screen, tap **Done** when finished

- New photos will appear as **+ Photo(s)** records to be synchronized back to the database under the Sync Data view in Tools/Options menu:

Managing Existing Photo Attachments

- To review existing attachments of a feature, the feature must be selected on screen

- Once feature is selected, tap the **Attachment** button

- The Attachment Form displays a list of all attachments currently associated with this feature.
- To view the photo in full screen view, tap on the thumbnail and choose an application to **Open With** from the pop up menu
- To delete an attachment, long tap on the thumbnail and choose **Remove Attachment** from the pop up menu
- To close the Photo Attachments form, tap **Done**

If there are many existing photo attachments, it may take several seconds before the existing photos and their thumbnails appear onscreen when Add Attachment form is first opened.

S1 Waypoints

S1 Mobile allows user to capture simple point locations on the device. These are called S1 Waypoints. The application will store the spatial location of a waypoint, along with a basic description field that is assigned by the user when point is created. While no substitute for an edit geodatabase, it can be an easy way to capture a quick X,Y location on the map. These waypoints are stored in the coordinate system WGS_1984_Web_Mercator_Auxiliary_Sphere.

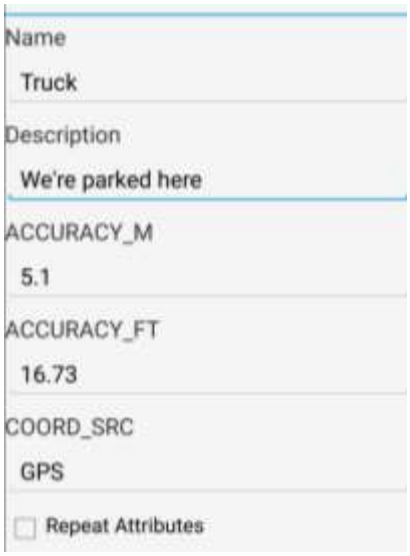
Collecting S1 Waypoint

- To collect, tap **Collect Features** button.

- Choose **S1 Waypoint** from list

Waypoint location can be captured via digitizing/drawing on screen or via Averaged GPS, in the same manner as collecting feature points described above.

- After geometry is saved, populate the description field and tap **Commit Edit** to store the GPS Waypoint on device.



- Waypoint location is recorded on screen as an orange dot. It can be selected, edited or deleted just like any other feature point.

Managing S1 Waypoint Data

S1 Waypoint information is stored in a JSON file on the device, and can be imported into GIS or to other file formats. In order to import into GIS, the file must first be copied off the device onto a network location known to ArcGIS.

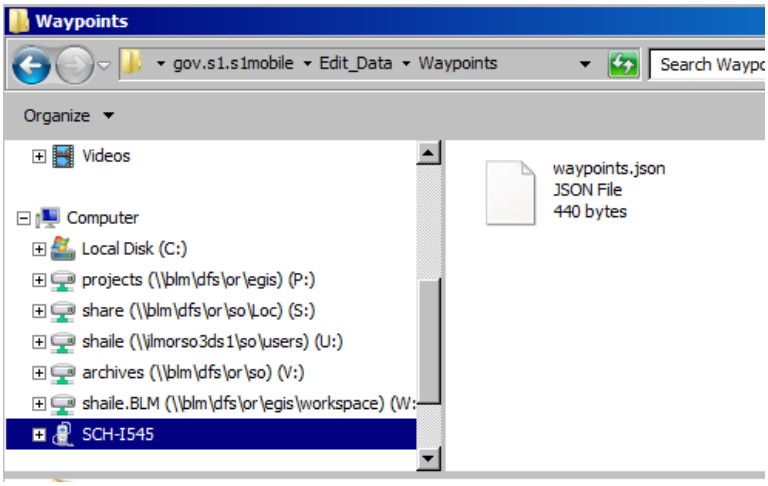
Assumptions:

- Android Device with SD Card installed
- USB cable
- ArcGIS 10.2 or later installed on a PC or Citrix

Copy Waypoint JSON File to Computer

- Connect Device to computer via USB cable.
- Using Windows Explorer, navigate to the following directory on your connected Android device.

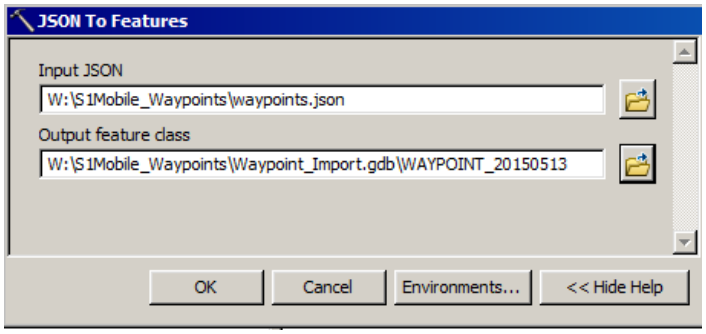
…\Card\Android\data\gov.s1.s1mobile\Edit_Data\Waypoints



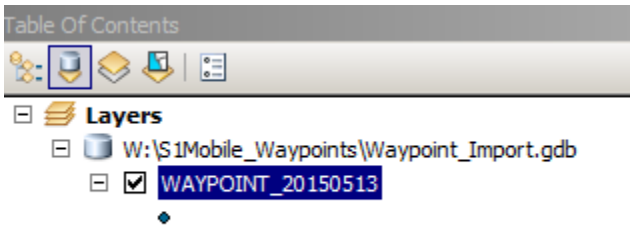
- Right-click on the file **waypoints.json** and choose **Copy** from the menu.
- Using Windows Explorer, navigate to a network location accessible to ArcGIS to paste the file. Click on **Organize -> Paste** to copy/paste the file into this directory.

Import JSON File into GIS

- Launch ArcMap 10.2 or later on PC or Citrix
- Choose **Geoprocessing Menu -> ArcToolbox -> Conversion Tools -> JSON -> JSON to Features**
    - **Input JSON** = the path to the file copied from the device
    - **Output Feature Class** = name of new feature class to be created (in an existing file geodatabase)



- After tool has run, new layer will be added to ArcMap.

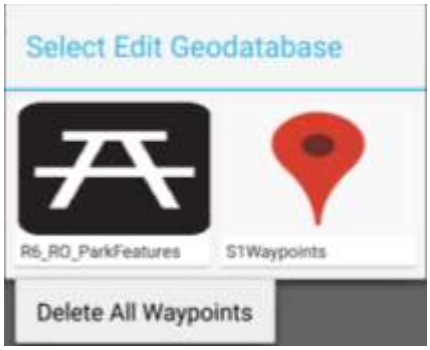


Deleting Waypoints on Device

Waypoints can be deleted individually by selecting each on the map and choosing the **Delete** option from the Selection toolbar. Or alternatively, the entire waypoint file on the device can be cleared out. This might be desirable after a group of waypoints are exported to GIS. To do so, use **Manage Map Layers**.

- Click on the **Manage Map Layers** icon.

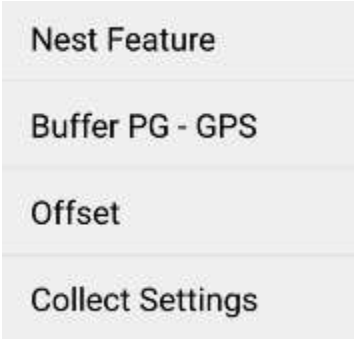
- Tap the current Edit Geodatabase icon, then long tap on the **S1 Waypoints** icon and choose **Delete All Waypoints**. This will clear all existing waypoints from the application.



Advanced Data Collection Tools

The advanced data collection tools can be found in the **Edit Options** button on the Edit Toolbar.

Tapping this button presents a menu of options, not all functions are operational in the current release of S1 Mobile:



Nesting a Feature While Collecting another Feature

While collecting a larger line or area feature, it may be desirable to "nest" a smaller feature inside of the larger one. To do so:

- If in GPS Stream mode, pause streaming by tapping the **Pause GPS Stream** button
- On Edit Toolbar, tap the **Edit Options** button

- Choose **Nest Feature** option, then choose the type of new feature to be nested
- Capture this nested feature in the manner of your choosing (GPS or drawing), save the nested feature's geometry & attributes just like a normal feature
- After capturing nested feature, resume capturing the original line or area feature by tapping either **GPS Stream** or **Averaged Vertex** button
- Repeat process as necessary to capture additional "nested" features before saving the geometry & attributes of the original line or area feature.

Buffer PG –GPS

This feature is not implemented in this version of S1 Mobile

Offset

This feature is not implemented in this version of S1 Mobile

Collect Settings

This opens the S1 Options form, where users can change # of averaged positions & Vertex Interval settings.

Copy Geometry

This function allows the user to copy the geometry and attributes of a selected feature into a new, separate record, into the same layer or into a different layer in the same GDB. It is only available when an existing record is selected, not during new data collection.

- The feature should already be selected and the **Edit Feature** button on the Selection Toolbar should already be enabled, if not do so

- On Edit Toolbar, tap the **Edit Options** button

- Choose **Copy Geometry** option, then choose which layer the selected record is to be copied into
- The attribute form for the chosen layer will appear; wherever the attributes fields match between the copied feature and the target layer, the existing attribute values will also be carried over. Fill out or change any relevant attribute fields, then tap **Save** to complete the copy action.

Estimated Accuracy & Feature Level Metadata

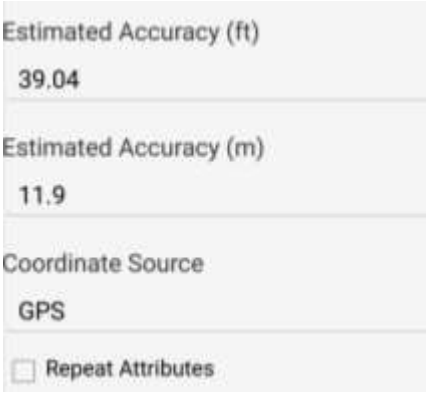
The S1 Mobile application can record a variety of metadata elements about the accuracy of collected and updated features, directly into the attribute field(s) of each record whenever GPS is used. The elements include:

- Estimated GPS accuracy (in feet and meters) to 95% confidence interval to meet the National Standard for Spatial Data Accuracy (NSSDA) requirements
- Quality of the GPS coordinate source used (No Fix, GPS, DPGS, RTK)

If any of the following fields are part of the published feature service and appear in the GDB layer being collected or edited, the S1 Mobile application will automatically populate them when a feature is created or updated via GPS:

- Field Name: ACCURACY_FT (double)
- Field Name: ACCURACY_M (double)
- Field Name: COORD_SRC (text, field length 7)

When GPS averaging is employed during data capture, the stored estimated accuracy will reflect the average accuracy of the total number of positions. These are read-only attribute fields and cannot be directly edited by user on the device.



If a feature is being updated via GPS, the following rules apply to accuracy field updates:

- If a point and geometry is updated, the stored accuracy & coordinate source attributes are replaced with current values

- If a line or area and geometry are updated, the accuracy attribute is updated with a combination of the stored accuracy and the current accuracy, using a weighted average of the total # of old and new vertices.
- If a line or area and geometry are updated, the coordinate source attribute is updated with the lowest source level obtained (GPS < DGPS < RTK)

If the feature is collected via digitizing, these fields are never populated or updated.

Navigation

When the GPS has a position fix, users can set a navigation target at a designated location in the map view.

- **Long tap** on screen to set a Navigation Target
  - A blue icon is placed at the location of the Navigation Target

    
  - A transparent Navigation Pane is displayed near the top of the map view. This pane provides distance and bearing values to the navigation target.
  - Distance value to target is displayed in feet or meters
  - Bearing value to target is displayed in degrees (True North)

- Distance/bearing values change as the GPS position moves in relation to the Navigation Target
  - Distance value decreases when moving towards the target
  - Distance value increases when moving away from the target
  - Bearing degree value changes as the GPS positon moves

- The application displays a toast at the bottom of the screen as the user approaches the navigation target

- The threshold for this alert is managed by the **Navigation Alert Distance** setting in S1 Options
- **Tap** the **Cancel Button** to clear the Navigation Target

- **Long tap** on screen to set a different Navigation Target

Tools

General application tools can be accessed via the S1 Tools/Options button

Measure Tool

This tool provides the capability to measure distance or area by sketching in the Map View. This tool also allows a user to determine the length or area of an existing feature.

Measure Distance or Area in Map View

To measure a distance or area in the Map View tap on **Tools/Options** on the Application Toolbar

- Select **Tools** from the list
- Select **Measure** to open tool

- **Tap** on screen where measurement will begin (*similar to digitizing a line or polygon*)
- Continue to **Tap** on screen until satisfied with measurement, length/distance measurement is reported at top of screen on the Measure Toolbar as additional vertices are added to sketch
- **Tap** on **Undo Vertex** button to remove last vertex in the sketch measurement

- Tap on **Distance Mode** to change tool from **Distance** to **Area**

Display units can be changed to *Metric* or *Statute* in the Options menu under Tools/Options on the Application Toolbar

- If application display units are set to Metric:
  - Distance is displayed in kilometers, unless measurement length is less than 0.10 kilometer then meters are displayed
  - Area is displayed in hectares, unless area measurement is less than 0.50 hectares then switch to square meters
- If application display units are set to Statute:

- Distance is displayed in miles, unless measurement length is less than 0.10 miles then feet are displayed
- Area is displayed in acres, unless area measurement is less than 0.5 acres then switch to square feet

- Tap on **Cancel** button  to exit Measure Tool

Determine Length or Area of Selected Feature

If a line or polygon feature is currently selected on screen, its length and area can be reported directly in the feature info window of a selected feature.

The measure tool can be also used to report this information. To report length or area of a selected line or polygon map feature using the Measure tool:

- Tap on **Tools/Options** on the Application Toolbar

- Select **Tools** from the list
- Select **Measure** to open tool

The selected feature's length or area will be reported at the top of the screen on the Measure toolbar

Display units can be changed to *Metric* or *Statute* in the Options menu under Tools/Options on the Application Toolbar

- If display units are set to Metric:
  - Distance is displayed in kilometers, unless measurement length is less than 0.10 kilometer then meters are displayed
  - Area is displayed in hectares, unless area measurement is less than 0.50 hectares then switch to square meters
- If display units are set to Statute:
  - Distance is displayed in miles, unless measurement length is less than 0.10 miles then feet are displayed
  - Area is displayed in acres, unless area measurement is less than 0.acres then switch to square feet
- Tap on **Cancel** button  to exit Measure Tool

S1 Application Options

The S1 Options form allows user to configure common settings across the application.

Number of Average Positions: this sets the default # of GPS positions that must be collected to create an averaged point feature or averaged vertex of a line or area feature when using the Average GPS button:

Streaming Interval: This is the interval at which the application captures GPS vertices while in streaming mode. This value is either # of seconds or in distance traveled, depending on the value specified in the streaming type settings.

Streaming Type: Time or Distance, this is the criteria that the streaming interval is based on.

Streaming interval & type are used when collecting via the **Begin Streaming** button:

Display Units: Metric or Statute (US). Will apply values across application, where units of measure are displayed.

Navigation Alert Distance: Threshold distance for alerting user that they are approaching a destination target. Units are specified by setting in S1 Options Display Units.

Waypoints Visible: If checked, stored waypoints are visible in the map view.

Accuracy Level: toggle GPS Position Toolbar estimated accuracy display between 68% (default) and 95% confidence interval. While most GPS receivers and data collection software display estimated accuracy statements only to a 50-68% confidence interval, the National Standard for Spatial Data Accuracy (NSSDA) requirements state reporting of estimated accuracy to a 95% confidence interval.

Auto Pan GPS: if checked, map pans to keep current GPS location centered in middle of map.

Coordinate Units: The coordinate system used by the application, this affects the format of XY values displayed on the GPS Toolbar as well as the XY information displayed in a selected feature's information pop up.

Log Off: AG4O user log in credentials are stored by the application. This button will log out the current user of the application, which allows a different person to log in. This capability is only available while device is connected to a network.

Do not log out of application and then go to field and expect to log back into application from the field; if you have no network connectivity you will be unable to access the application until the device is back on network to perform log in.

Creating & Sharing User Reference Maps

This section describes how to create User Reference Maps via ArcMap for offline consumption with the S1 Mobile application. In S1 Mobile, users can add a User Reference Map to display on top of the existing base map. This User Reference Map can be either a multi-scale ESRI tile package (.tpk) or a single geo-referenced GeoTIFF image file. User Reference Maps can be shared and downloaded to mobile devices via ArcGIS for Organization (AG4O) over Wi-Fi or cellular networks and can also be manually copied to a mobile device via Windows Explorer.

Assumptions:

- Access to ArcGIS Desktop 10.2.0 or later
- Access to a government furnish Android device with a network connection, with S1 Mobile 1.0 application installed
- User name and password to your agency's ArcGIS for Organizations (AG4O) website

Creating a Tile Package

Tile packages (.tpk) are a bundle of pre-rendered image tiles, generated for a specific area at several different scales that are wrapped into a single file. Unlike a paper map or a single digital image file, which presents a map at a single scale, a tile package can present a map at multiple scales to the user, providing appropriate layer representations for a variety of map scales.

Below is an example of a tile package presenting tiles at different scales, images taken from ArcGIS Resource Center.

Once they have been created, the tile package can be used to quickly render lightweight image files to applications. They can take consider time and resources to create however, so it is important to fine-tune your ArcMap map document (.mxd) prior to turning it into a TPK for use on mobile devices. This document will attempt to provide some specific tips for optimizing your MXD prior to TPK generation.

For more general information on tips for creating tile packages see this link:

http://resources.arcgis.com/en/help/main/10.1/index.html#/Tips_for_creating_tile_packages/006600000456000000/

Preparing the Map Document

In order to create a tile package from ArcMap, one must first enable ArcGIS Runtime Tools. Click **Customize -> ArcMap Options… -> Sharing tab** and the check box to **Enable ArcGIS Runtime Tools**, then click **OK**.

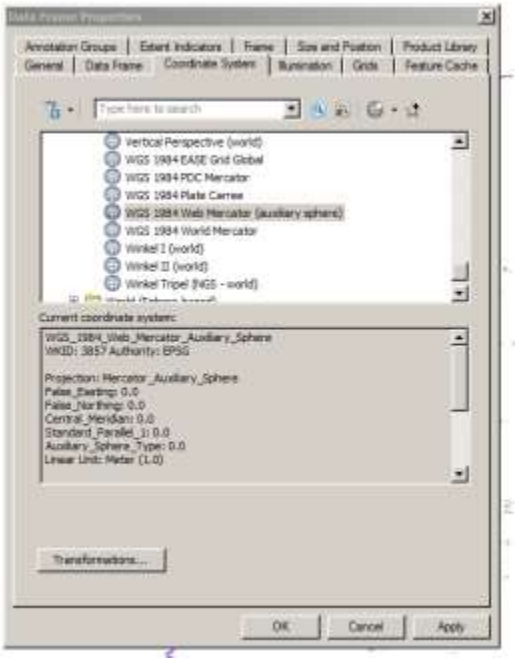
A map document's data frame properties must:

- Have its coordinate system set to WGS 1984 Web Mercator (auxillary sphere)
- Have a datum transformation applied (if map contains NAD83 data)
- Have a Extent Used By Full Extent Command defined to a specific extent
- Utilize the Clip Options to "Clip to Shape" to define the outer edge of the map extent
- Have the Frame Background color set to "No Color"

It is recommended that you start using a new map document, rather than an existing one. Add only the layers needed to create this package. Set each of the layers' properties, including minimum and maximum scales for both layer and label visibility.

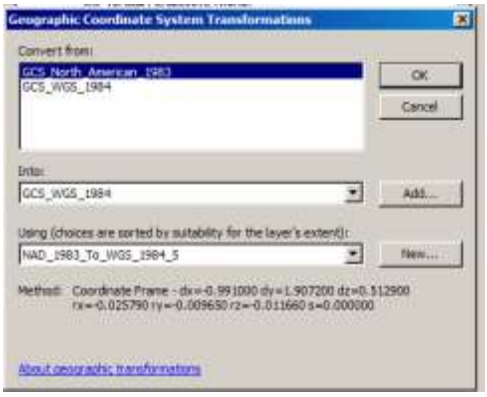
Set Data Frame Coordinate System & Datum Transformation

- Go to **View menu -> Data Frame Properties… -> Coordinate System Tab**
- **E**xpand **Projected Coordinate Systems folder**
- Expand **World folder**
- **S**elect **WGS 1984 Web Mercator (auxillary sphere)**



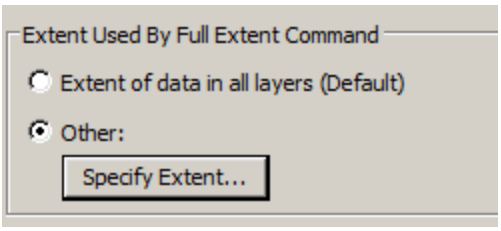
- Click **Transformations… button**
- Set as shown below (if there are NAD 83 layers in this maps)

Click **OK** to close the transformations window, and **OK** to save changes and close Data Frame properties

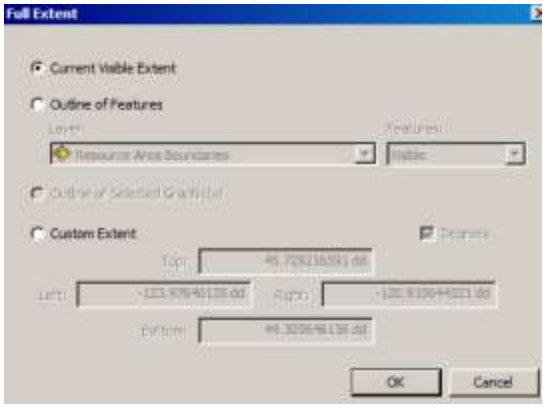


Set Full Extent Command and Clip to Shape

- Zoom & pan map to the maximum extent desired in the output tile package. The farther zoomed out, the longer this process will take (and the larger the output file) so only zoom out to as far as needed.
- Go to **View menu -> Data Frame Properties… -> Data Frame Tab**
- In the Extent Used By Full Extent Command, click **Specify Extent button**



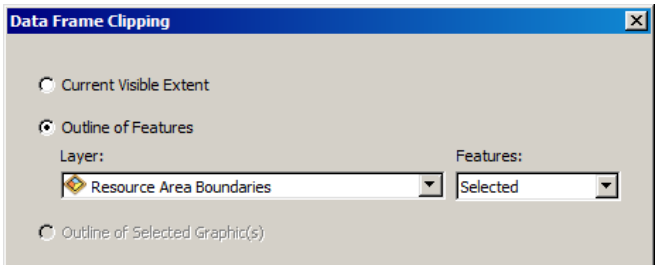
- Choose **Choose Current Visible Extent** and click **OK**



- In the Clip Options, choose **Clip to Shape** and then click **Specify Shape**

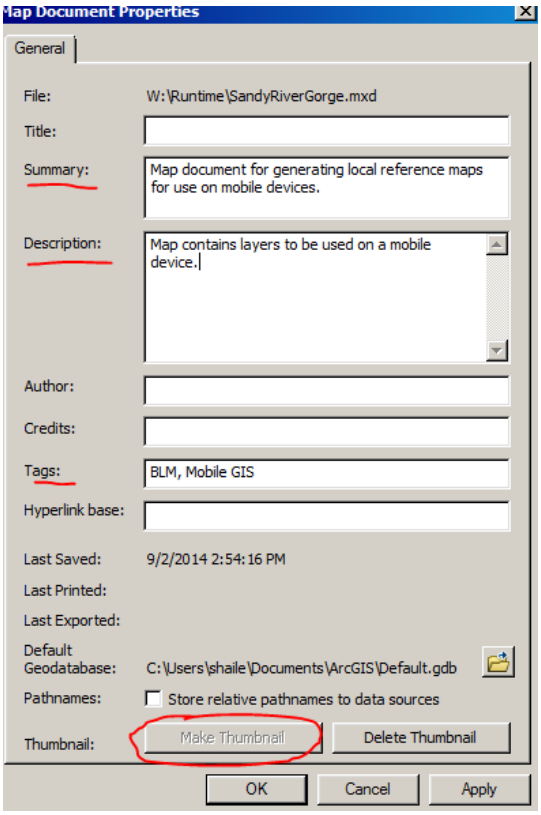
- Choose **Current Visible Extent** to clip to the current view, and then click **OK**.

Alternatively, if you wanted to clip to a specific area (ex: a District or Forest boundary), you would first select that feature and return to this form and choose **Outline of Features** and then choose the Layer and Selected. This would be preferred, and would help to reduce the size of the tile package and processing time.



Set Map Document Properties

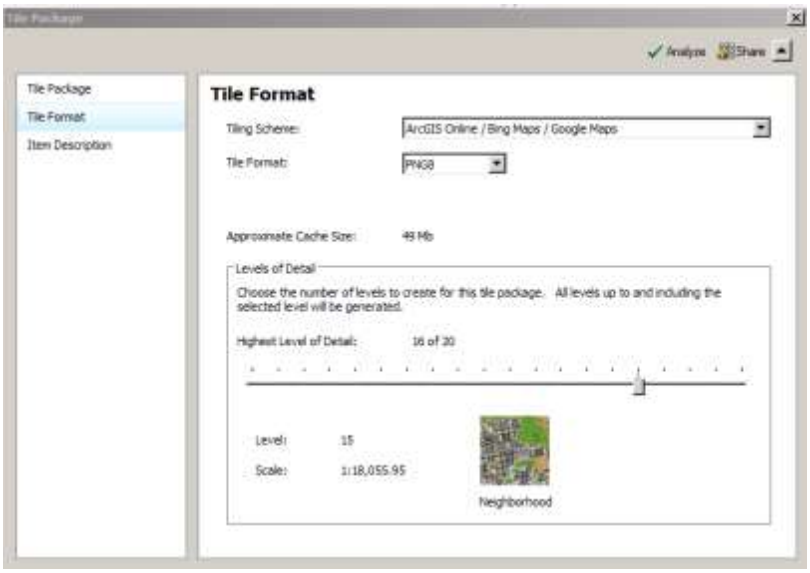
- Go to **File menu -> Map Document Properties**
- Fill in the **Summary, Description, Tags** sections, and optionally, click **Make Thumbnail**, and then click **OK**



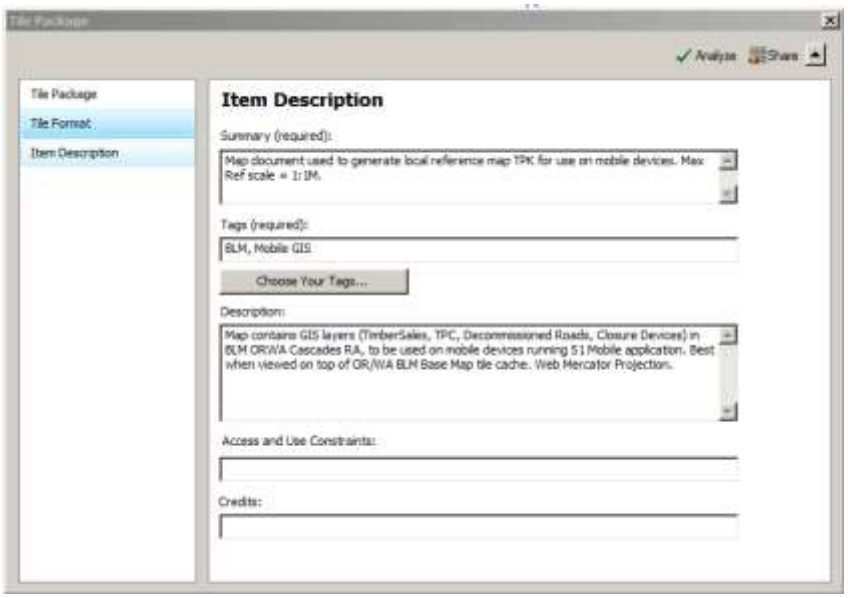
- Save Map Document and Close ArcMap

Create Tile Package

- Go to **File menu -> Share As -> Tile Package…**
- Specify the location to save the tile package on the network
- Click the **Tile Format** tab



- Check box to **Package for ArcGIS Online/Bing Maps/ Google Maps**
- Set **Tiling Format = PNG8**
- Set Level of Detail by moving the slider bar. The greater level of detail, the larger the tile package size and the longer it will take to generate the package. Try to keep the package under 100MB in size.
- Click the **Item Description** tab.



- Populate the Required field sections in this form
- Click **Analyze**. A second window will appear, showing errors/warnings about your map document. Fix all Errors before proceeding.
- Click **Share** to create the tile package. Depending on the level of detail you chose, this tool will run for several minute to several hours to complete.

Creating Geo-referenced Image File

Unlike tile packages, which present a map at multiple scales, a geo-referenced image is a single image at a single map scale. These are very quick & easy to generate, however they may not be appropriate for viewing on the mobile device at all map scales. The supported geo-referenced image file format is the GeoTIFF file format.

Preparing the Map Document

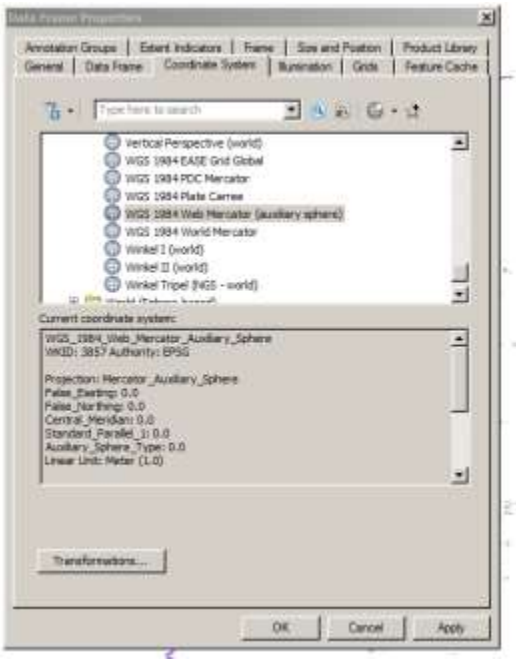
A Map Document's Data Frame properties must:

- Have its coordinate system set to **WGS 1984 Web Mercator (auxillary sphere)**
- Have a datum transformation applied (if map contains NAD83 data)
- Have the Frame Background color set to **"No Color"**

It is recommended that you start using a new map document, rather than an existing one. Add only the layers needed to create this image.

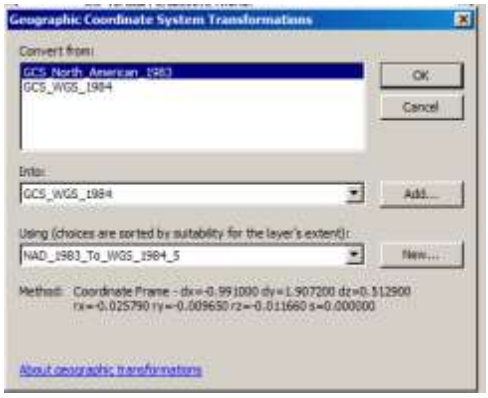
Set Data Frame Coordinate System & Datum Transformation

- Go to **View menu -> Data Frame Properties… -> Coordinate System Tab**
- **E**xpand **Projected Coordinate Systems folder**
- Expand **World folder**
- **S**elect **WGS 1984 Web Mercator (auxillary sphere)**



- Click **Transformations… button**
- Set as shown below (if there are NAD 83 layers in this maps)

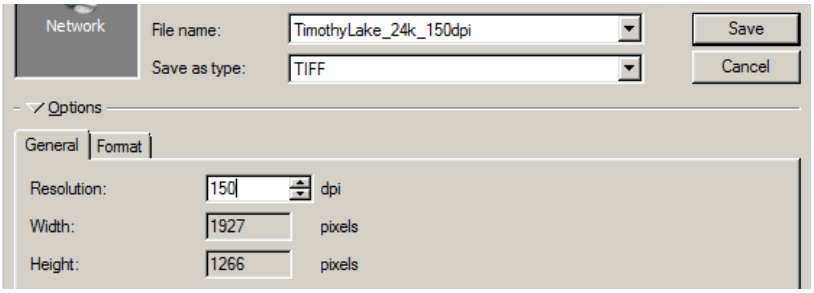
Click **OK** to close the transformations window, and **OK** to save changes and close Data Frame properties



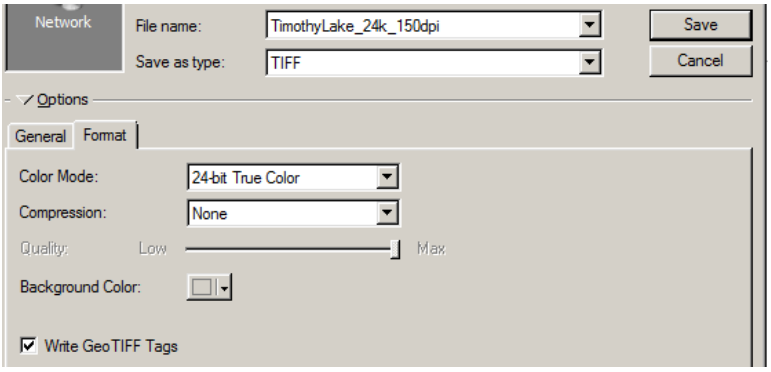
- Save Map Document.

Set Export Extent & Export Image

- Zoom/pan map to the desired extent to export. Do not have a map scale greater than 1:500,000 when exporting geo-referenced maps. In fact, it is recommended to have a map scale of 1:100,000 or better (1:50,000, 1:24,000, 1:10,000) to achieve a readable image file.
- Go to **File -> Export Map…**
- Give the output file a name, choose the **Save as Type = TIFF**
- Under the general tab, set the resolution = 150 dpi



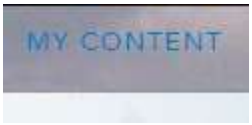
- Under the Format tab, Color Mode = **24-bit True Color**, Compression = **None**, Background Color = **No Color**, check **Write GeoTIFF Tags.**



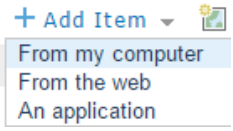
- Click **Save** to export the current map view to a geo-referenced map.

Upload & Share Reference Maps to AG4O

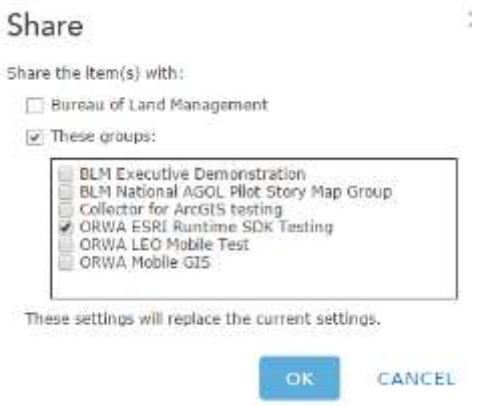
- Log into your Agency's ArcGIS for Organization, by going to: https://www.arcgis.com/home/signin.html
- Click **My Content** at top of web page.



- Click **Add Item -> from my computer**



- Click **Choose File** and browse to the location of the geo-referenced image or tile package you wish to upload.
- Enter at least one **Tag** to identify your layer.
- Click **Add Item** to add to your content on AG4O.
- In AG4O, go to **My Content**, click on the name of your image layer to see its information.
- Click the **Share** button on the content properties screen and place a check mark next to the groups you wish to share this layer with, and then click **OK** to commit the share modifications.



Now when using S1 Mobile application, users belonging to the group will be able to see and download this User Reference Map. For more info on this process, see Downloading User Reference Map to Device.

Creating & Sharing Editable Feature Services

This section describes how to publish and share a feature service for offline consumption with the S1 Mobile application. In the ESRI Runtime SDK, these downloaded feature services are known as **runtime geodatabases (GDB).** In the S1 Mobile application, they are referred to as **Edit Geodatabases (GDB).** All of these terms are synonymous with the concepts described in this document.

Assumptions:

- Access to an enterprise relational geodatabase (RDBMS) running ArcSDE 10.2 or later, with database/schema owner privileges
- Access to ArcGIS Server 10.2.2 or later (10.3 or later if data has related tables) that uses Token-based authentication, with publishing rights
- Access to a government furnish Android device with a network connection, with S1 Mobile for Android application installed
- User name and password to your agency's ArcGIS for Organizations (AG4O) website

Loading Data into RDBMS

Feature classes must be loaded into an enterprise geodatabase and configured to meet offline synchronization capability criteria outlined as outlined by ESRI.

Data sets must:

- Contain non-versioned datasets (versioned is supported in SDE 10.3 and higher)
- Archiving must be enabled on datasets
- Datasets must include GlobalIDs
- Relationship classes and attachments must use a GLOBALID primary key

For more info on these specifics, see:

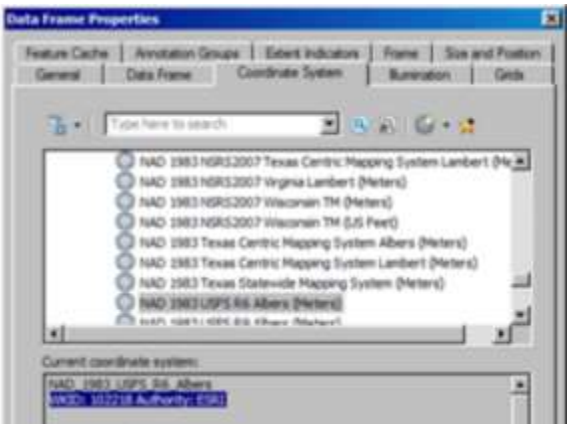
http://resources.arcgis.com/en/help/main/10.2/index.html#//0154000006m1000000

Publishing Sync-Enabled Feature Service

Add the data to a map using an editor account registered with ArcGIS Server, and prepare the data layers for publishing to ArcGIS Server. For general information on preparing a map document for publishing, see this:

http://resources.arcgis.com/en/help/main/10.2/index.html#//0154000003nt000000

Before publishing the service, ensure that the coordinate system defined in the Data Frame properties has a known WKID value, not a custom value. If the coordinate system is based on a datum other than WGS84, ensure the proper datum transformation as well before publishing.



When publishing the feature service, check the **Feature Access** capability and enable the **CREATE, DELETE, QUERY, SYNC** and **UPDATE** capabilities.

If this ArcGIS Server is served by an external web adapter, it may be possible to access the feature service from outside the Agency network. If this is the case, only publish the service using an HTTPS connection; never use unsecured HTTP connections when publishing content that will be used to collect data.

If it is hosted on an internal ArcGIS Server without an external web-adaptor, then the feature services will only be available on Agency networks or via VPN.

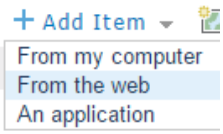
If the feature service is accessible through an external web-adapter, the service should be secured to only allow authenticated users access to it. This is accomplished through the ArcGIS Server Manager Web interface. If the service is secured, users will need to supply their Active Directory credentials before gaining access to the service. The service can be secured to all authenticated users or to a selected Active Directory group, if desired. Securing feature services that are externally exposed is highly recommended and is considered a best practice.

Add the Feature Service as AG4O Feature Layer

Log into your Agency's ArcGIS for Organization, by going to: https://www.arcgis.com/home/signin.html

Click **My Content** at top of web page.

Click **Add Item -> From the web**

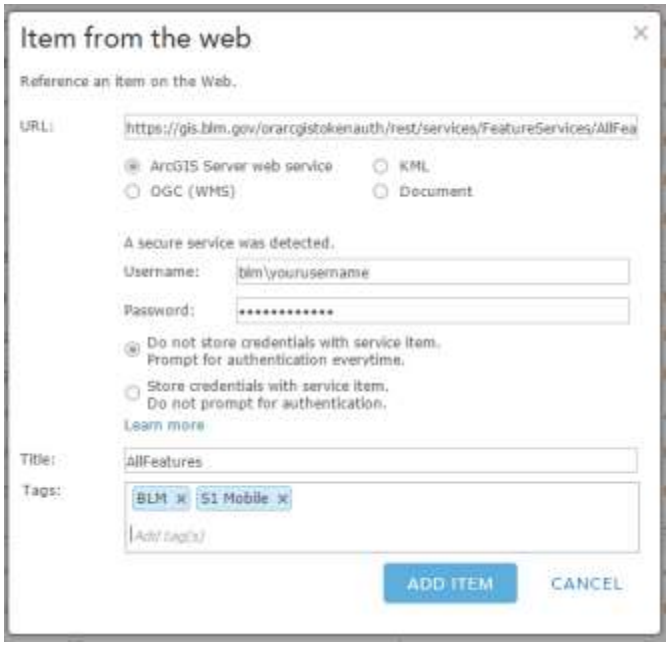


Enter the URL of your feature service. It should end in **/FeatureServer**

If your feature service is secured, you will be prompted to enter your user name and password. Enter it, but choose the option for **Do not store credentials with this service item**.

Enter at least one **Tag** to identify your layer.

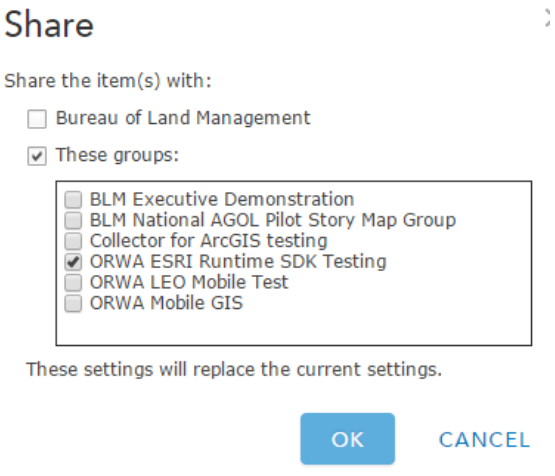
Click **Add Item** to add to your content on AG4O.



Share Feature Layer and Enable for S1 Mobile

In AG4O, go to **My Content**, click on the name of your feature layer to see its information. If it is a secured feature service, you will be prompted to enter your AD user name and password.

Click the **Share** button on the content properties screen and place a check mark next to the groups you wish to share this layer with, and then click **OK** to commit the share modifications.



Now when using S1 Mobile application, users in the shared group will be able to see and download an edit geodatabase for this feature service. For more info on this process, see Download Edit GDB.

Interacting with Hosted Feature Service Content in ArcMap

Once records are synchronized back to the feature service, the service can be viewed in AGOL via a web browser, or the data can be viewed or edited in ArcMap.

Adding Hosted Feature Service to ArcMap

- File Menu -> Sign In
- Enter your AG4O credentials, click **Sign In**
- File Menu -> ArcGIS Online…
- Click My Groups
- Click on group name where service is shared
- Find service, click **Add** to add to ArcMap (if it says **Open** that is a web map & that is not what you are looking for)

Once added to a map document, it can be used like any other layer in the map, with one exception: it cannot be directly edited. To edit the records of a hosted feature service, follow the instructions in the next section.

Create a Local GDB Copy for Editing

- Switch Table of contents to **List by Drawing Order**

- Right Click on the Feature Service Name in ArcMap table of contents
- Edit Features -> **Create Local Copy for Editing**

- A local file GDB edit replica is created in your roaming profile and added to map
- Make your edits in normal ArcMap edit session, save edits, stop editing

To synchronize your changes back with the service….

- In **List by Drawing Order** View: **Right click on Feature Service name in table of contents -> Edit Features -> Synchronize Local Edits with Server**

- The map layers switch back to the feature service after synchronization occurs

If you do just want a local copy for analysis but do not intend to edit the features:

- In **List by Drawing Order** View: **Right click on Feature Service name in table of contents -> Edit Features -> Disconnect Local Copy from Server**

This might be desirable if you would like a local GDB for distribution off network or for geoprocessing analysis. Just remember, all edits should be synchronized back to the hosted feature service.

Application Capabilities

Below is a list of the planned capabilities of this application. Not all requirements are implemented in version 2.0 of this application.

Functional Specifications

Function	Implementation Status
Application runs on a modern smartphone platform	Implemented 1.0
Integrates with existing enterprise GIS (EGIS) infrastructure	Implemented 1.0
Is low cost and requires little training to operate	Implemented 1.0
Can display commercial and agency authoritative base maps	Implemented 1.0
Can display user-generated reference maps	Implemented 1.0
Can display maps and collect data without connection to a cellular or WiFi network	Implemented 1.0
Allows the capture of GIS data features and attributes	Implemented 1.0
Allows for the tracking of who collected a feature and when it was collected	Implemented 1.0
Can capture feature linked photographs	Implemented 1.0
Feature edits and photographs can be synchronized directly back to GIS databases	Implemented 1.0
Spatial data can be captured via sketching on screen or via GPS	Implemented 1.0
GPS data can be averaged to improve accuracy	Implemented 1.0
Linear features can be captured via GPS streaming or via vertex averaging	Implemented 1.0
While collecting one feature, a second feature can also be nested	Implemented 1.0
Estimated accuracy of GPS is reported on screen	Implemented 1.0
Can capture simple “waypoint” locations on device	Implemented 1.0
Ability to edit the geometry of existing GIS features	Implemented 2.0
Ability to duplicate or copy feature geometry and attributes	Implemented 2.0
Ability to repeat attributes from one feature to next	Implemented 2.0
Statistical estimation of spatial accuracy is stored with each feature edit	Implemented 2.0
Can interface with high accuracy (sub-meter) GPS receivers for precise spatial data collection	Implemented 2.0
Display GPS location in different coordinate systems	Implemented 2.0
User can set navigation targets and device will provide distance, direction and navigation alerts to the destination	Implemented 2.0
Related table data collection will be supported	Implemented 2.0
Measuring tools for reporting distance and area are provided	Implemented 2.0
Distance based GPS Streaming is supported when collecting lines and areas	Implemented 2.0
Feature edits of local geodatabase data set will be supported	Planned
Geo-tagged photos can be captured	Planned 3.0
Query tools will be provided for edit layers	Planned 3.0
Collection of new features via directional offsets	Planned 3.0
Capture a GPS Track log of where user goes with device	Planned 3.0
Ability to generate a polygon feature using a supplied buffer value	Planned
Custom edit forms will be supported	Planned

Technical Specifications

- Android OS, version 4.0 “Ice Cream Sandwich” or later

- ESRI Runtime for Android SDK 10.2.8
- Wi-Fi network availability for map download and synchronization
- Internal GPS receiver or supported external Bluetooth receiver
- Integrated digital camera (for capturing images)
- ArcGIS Server 10.2.2 or later feature services for edit data download and synchronization
- Affiliation with BLM, USFS or NPS ArcGIS for Organization account

Supported Hardware

- Samsung Galaxy S3, S4, S5, S6 smartphones
- Samsung Galaxy Tab 3, 4, S2, & Active tablets
- Garmin Monterra handheld
- Cedar CT4 ruggedized handheld
- Cedar CT7 ruggedized tablet
- Trimble R1 bluetooth receiver
- Trimble Geo 6000 & 7x handheld receiver ***
- Garmin GLO bluetooth receiver

***Due to a Trimble business decision, their Geo 6000 & Geo 7x receivers are incapable of correctly exporting estimated accuracy values to external applications. While these devices do collect very accurate spatial locations, the estimated accuracy values provided in the S1 Mobile application will not reflect this level of accuracy due to Trimble software limitations imposed on this hardware.

Known Hardware Limitations

- # of Satellites listed on GPS toolbar are incorrect when using Samsung Galaxy S2
- GPS Streaming performance may become impaired when more than 5000 streaming positions are captured without saving feature
- Last known GPS location may appear as current GPS location when GPS is first activated, which may not reflect actual current GPS location until a new position fix is obtained
- External GPS Receiver support requires the ability to enable Mock Locations, which is blocked by BLM MaaS360 Policy. Users must submit a Remedy ticket to obtain a waiver to enable this functionality on the BLM government furnished equipment (GFE).
- When using Bluetooth receivers, if Bluetooth connection is lost (ex: due to GPS receiver power failure) the GPS status bar may continue to report the last known coordinates.
- When using Bluetooth receivers, if switching between different Bluetooth receivers a restart of the device may be necessary in order to receive correct GPS information from the second Bluetooth receiver.

Installation

The app is not found in the Google Play Store, installation will typically be handled remotely via your agency. If the device is not a government furnished device managed by mobile device management software, the application must be manually downloaded to device and installed.

BLM Government Furnished Device

To request the application be published to your BLM device, submit a Remedy Help Desk Ticket. Request Steps:

1. IT Services -> Phone, Mobile Device, Network Services -> Mobile Device Support -> Request Now
2. "What do you need help with?" -> choose **Mobile App Deployment to Device**
3. "Select the Mobile App" (pick list) -> choose **S1 Mobile for Android** from pick list
4. Provide user email address associated with device
5. Provide device model name under Device Name

Once the ticket is completed, the application will be pushed to the device via MaaS360 device management software.

Install S1 Mobile application via MaaS360

- Applications -> MaaS360

- MaaS360 interface appears.

- Tap on App Catalog icon

- Tap **Refresh** button at right of screen to update App Catalog

- Under the "All" tab, tap **Install** and then **Download**. This will install the application.

- After application is installed, it can be launched from the list of Android applications.

Upgrade S1 Mobile application via MaaS360

Once the application has been deployed to your BLM government furnished device, application updates are available via MaaS360, and no help desk ticket is required to receive them. You must initiate the upgrade process yourself from within the MaaS360 application.

- Applications -> MaaS360

- MaaS360 interface appears.

- Tap on App Catalog icon

- Tap **Refresh** button at right of screen to update App Catalog

- Under the "All" tab, next to S1 Mobile application tap **Update,** then **Download** and finally **Install**. This will install the updated application.

- After application is upgraded, it can be launched from the list of Android applications.

USFS Government Furnished Device

If this is a USFS government furnished Android device, it must first be enrolled with the USDA Mobile Iron before installing the S1 Mobile for Android application. If your device is already configured with Mobile Iron, please skip to next section.

Configure device with Mobile Iron

1. Submit a USFS Customer Help Desk (CHD) ticket to request that your device be enrolled in Mobile Iron and that you be sent a PIN code via email to configure Mobile Iron on device. If the device was purchased via Technical Approval (TA), you may need to indicate this to CHD; otherwise they will want to know the name of the carrier the device was purchased from. CHD Help Desk Phone # 866-945-1354
2. Insert micro-SD card if you plan to use one
3. Charge battery to at least 80%, then turn device on
4. Follow CHD instructions (internal FS link) for setting up Android device
5. Connect to cell data network or to public WiFi
6. Check for and download OS Updates: Settings -> General tab -> About Device -> Software Update - > Update Now
7. Once you have received your PIN via email, follow CHD instructions (internal FS link) for configuring device with Mobile Iron and Touchdown
8. (Optional) Submit request (internal FS link) to allow device connection to FS WiFi. You only need to do this if you have FS WiFi in your office
9. (Optional) Connect to FS Wifi via CHD Instructions (internal FS link)

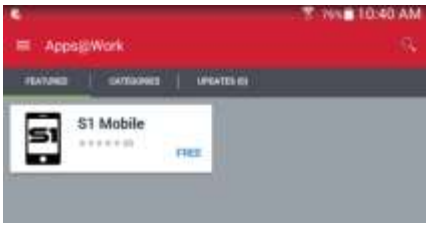
Once the device is configured with Mobile Iron, the application will be available to all USFS users via Mobile Iron Mobile@Work device management software.

Install S1 Mobile application via Mobile Iron Mobile@Work

- Launch Mobile Iron **Mobile@Work** app on device

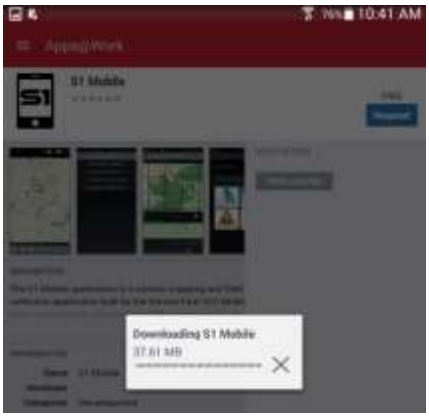
- In upper left corner of screen tap menu button and choose **Apps@Work**

- Under the **FEATURED** tab, tap the **S1 Mobile – Free** icon

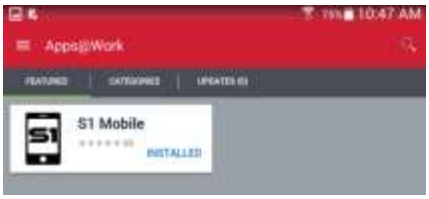


- Tap the blue **Request** button to initiate download

- App will begin to download, progress shown on screen



- After download and installation is successful, Apps@Work will show the S1 Mobile as **INSTALLED**



- Launch the application using the application icon that is created on the main screen of the device

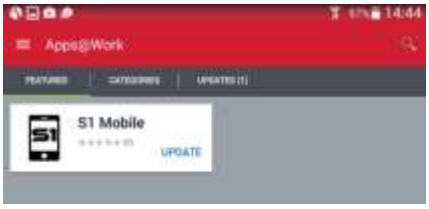
Upgrade S1 Mobile application via Mobile Iron Mobile@Work

Once the application has been deployed to your USFS government furnished device, application updates are provided automatically via Mobile Iron. You must initiate the upgrade process yourself as shown below.

- Launch Mobile Iron **Mobile@Work** app on device

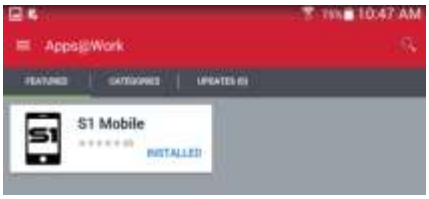
- In upper left corner of screen tap menu button and choose **Apps@Work**

- On the Features tab, tap the **S1 Mobile – Update** icon



- Tap the blue **Update** button to initiate download
- App will begin to download, progress shown on screen

- After download and installation is successful, Apps@Work will show the S1 Mobile as **INSTALLED**



- Launch the application using the application icon that is created on the main screen of the device

Non- Government Furnished Device

If the device is not a government furnished device managed by mobile device management software, the application must be manually downloaded to device and installed. Because it is not coming from the Google Play Store, the device must also be set to allow installation of unknown apps. If you have an older build installed on device, you may need to first uninstall it before installing a new build.

- Open Chrome application (or other Internet Web Browser) on device and enter the following URL to initiate download to the device: http://www.blm.gov/or/gis/files/mobile/S1%20Mobile.apk **-or-**

Scan this QR code using a QR Reader application on your device to initiate download:

If downloading the application to a Samsung Galaxy S5 device, it may be necessary to first install FireFox and choose it as the browser to download the file; the Chrome browser has been known to be unsuccessful in downloading installation packages on the Galaxy S5 device.

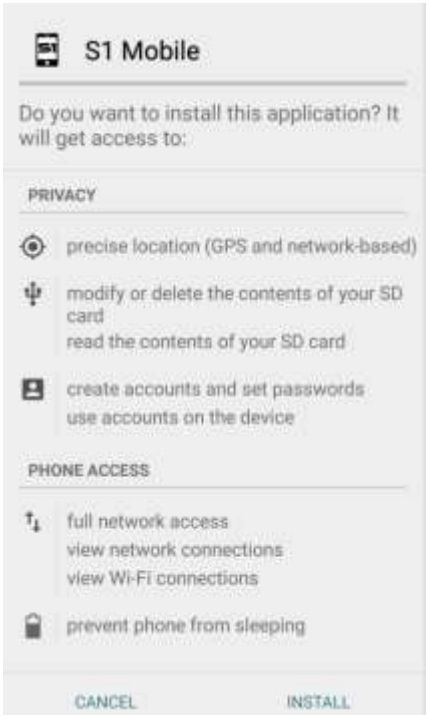
- After file has finished downloading to device, navigate to its location (typically the Downloads folder) on the device using the **My Files** or **File Explorer** application on the device (app may be called by a different name depending on device model) and tap on the **S1 Mobile.apk** file to start the install
    a. If you get this message:

    b. Tap Settings -> Security-> Unknown Sources. Put check box next to “Unknown Sources”

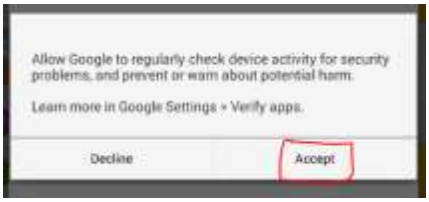
    c. Uncheck “Allow initial installation only” tap **OK**

d. If installation doesn't automatically proceed, return to the APK and tap on it again to re-initiate the installer

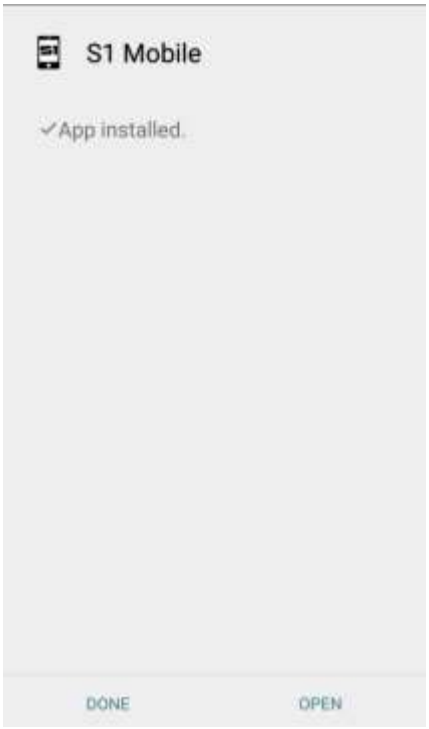
- Step through the app installation screens
  a. Click **Install**



b. If you receive the following message, tap **Accept**



c. Click **Open** to open the app



Uninstalling Application

It is not typically necessary to uninstall the application. However, should you decide to manually uninstall the application, be aware that doing so will also delete the contents of the S1 Mobile application directory; this includes both the internal storage and the SD card storage location. Before manually uninstalling the application, back up and downloaded application content (base maps, user reference maps, offline geodatabases) from the following directories:

…\Card\Android\data\gov.s1.s1mobile

…\<Device>\ Android\data\gov.s1.s1mobile

External Bluetooth GPS Receiver Support

The S1 Mobile application can also feed GPS measurements from supported external GPS receivers via Bluetooth to provide high accuracy location information to the application's map view. This may be desirable if the estimated accuracy of the device's internal GPS does not meet data accuracy requirements or if the Android device does not possess its own internal GPS receiver.

Generally, to use external receivers with Android devices, the following steps must be performed:

1. Turn on Bluetooth on Android device and on external receiver
2. Pair external receiver with device via Bluetooth
3. Enable Mock Location setting in Android developer options
4. Activate external GPS within application

Some these steps can be accomplished from directly within the S1 Mobile application when using supported external GPS receivers, which include:

- Trimble R1 bluetooth receiver
- Trimble Geo 7x handheld receiver
- Garmin GLO bluetooth receiver

Other models may also function with the app, but steps to pair may be different than what is described below for unsupported receivers.

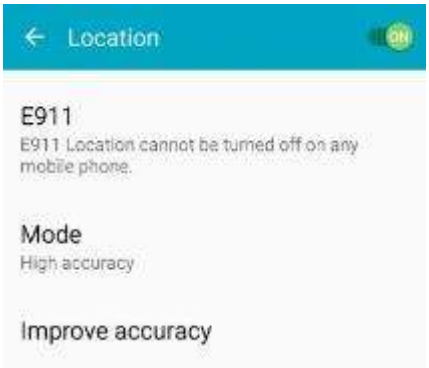
Configure Location Settings

In order to ensure that you are only receiving measurements from the device's GPS receiver and not from Android network location services, one should set the Android Location setting to GPS Only. The Improve accuracy setting also needs to be disabled to prevent the device from attempting to improve accuracy by using Wi-Fi and Bluetooth scanning.

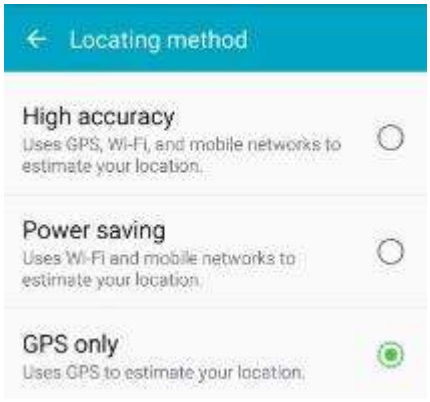
Use the appropriate method below depending on the operating system of the device.

Android Operating Systems (version 5 and newer)

- On device, go to **Android Settings-> Location**

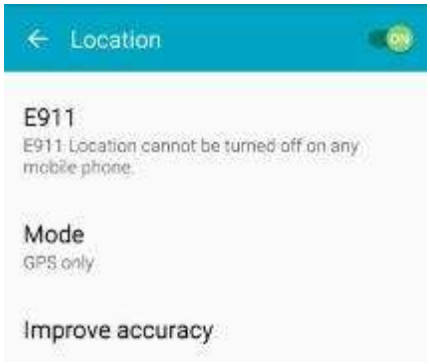


- Tap **Mode**, set Location method to **GPS Only**



- Tap **Back button** at top left of screen next to Location method to return to Location settings.

- Tap **Improve accuracy**



- Verify both **Wi-Fi scanning** and **Bluetooth scanning** are toggled **OFF**

Older Android Operating Systems (version 4)

- On device, go to **Android Settings-> Connections-> Location**

- Tap **Mode**, set Location to **GPS Only**

Configure Date and Time Settings

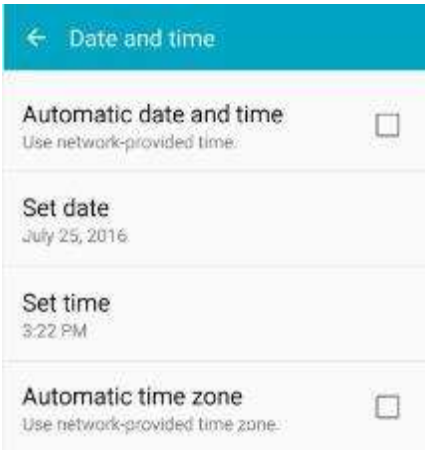
The S1 app checks the location time stamp against the Android system time to determine if the position being provided is an old or new location. The time stamp and system time must be in sync for the Bluetooth GPS to work correctly. Check the box next to Automatic date and time as well as Automatic time zone to enable this functionality. These settings enforce the device's date, time, and time zone to be provided automatically by the network.

Use the appropriate method below depending on the operating system of the device.

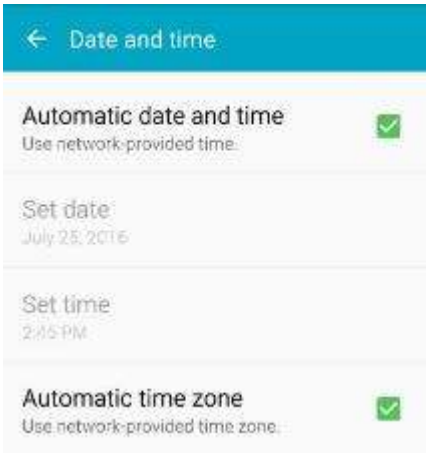
Android Operating Systems (version 5 and newer)

Before going to the next step, it is important to be connected to a Wi-Fi or 4G network. This ensures the device's time is automatically set based on the Wi-Fi or 4G network.

- On device, go to **Android Settings-> Date and time**



- Tap **Check box so there is a green check next to Automatic date and time and Automatic time zone**



Older Android Operating Systems (version 4)

Before going to the next step, it is important to be connected to a Wi-Fi or 4G network. This ensures the device's time is automatically set based on the Wi-Fi or 4G network.

- On device, go to **Android Settings-> General-> Date and time and verify settings are** updated

Enable Developer Options and Mock Locations

To use the Bluetooth GPS capability of the S1 app a few settings must be configured so the device can communicate with the Bluetooth GPS receiver. The first step is to enable Developer Options on the device. Enabling this option allows the device to use Mock Locations. Mock Locations is necessary in order for the Bluetooth GPS receiver location to be used instead of the device's internal GPS location.

If you are unable to enable setting this due to BLM MaaS360 policy restriction, you must submit a Remedy help desk ticket in order to enable this setting: IT Services -> Mobile Device Support -> Request Now -> "What do you need help with?": Device Setup (MaaS360, Google Mail etc) -> "Do you need to change the device setup plan (MaaS360)?": Yes -> "Select the setup plan": GIS Device (Enable Mock Locations – Android Only).

Use the appropriate method below depending on the operating system of the device.

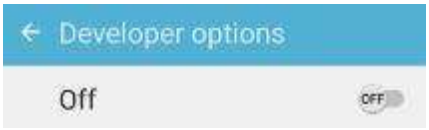
Android Operating Systems (version 5 and newer)

- On device, go to **Android Settings-> About phone**
- **Tap on Build number repeatedly until a prompt appears indicating Developer options has been enabled**

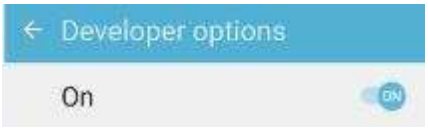
- Tap **Back button** at top left of screen next to About phone to return to Settings

- Tap **Developer options**

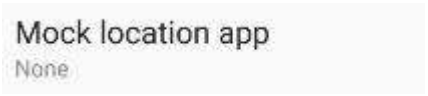
- Tap **OFF** toggle to enable Developer options



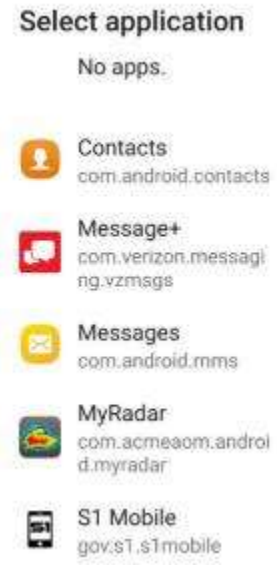
- Developer options are now turned on



- Scroll down and tap **Mock location app**



- Tap **S1 Mobile** to select app



- Mock location app is now set to S1 Mobile

Older Android Operating Systems (version 4)

- On device, go to **Android Settings-> About phone**
- **Tap on Build number repeatedly until a prompt appears indicating the device has Developer options enabled**

- Tap **Back button** at top left of screen next to About phone to return to Settings.

- Tap **Developer options**

- **Make sure the Developer options are turned on**

- Tap **Check box** so there is a green check to enable allow mock locations

Pairing Trimble R1 Receiver

Device is a sub-meter (in open canopy) receiver, capable of tracking GPS & GLONASS satellites, and can receiver WAAS and RTK corrections.

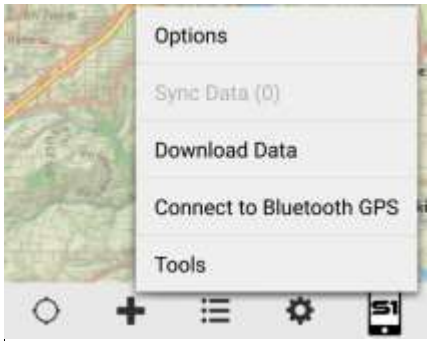
Trimble R1 documentation: http://www.trimble.com/globalTRL.asp?nav=Collection-109386

- **Activate GPS** should be turned off in S1 Mobile application
- Turn on power to Trimble R1

Pairing Device for First Time

- First time pairing device, after powering Trimble R1 device on press & hold power button until rapidly flashing blue light appears, now device is visible to other devices for 60 seconds for pairing purposes
- In S1 Mobile app, tap **Tools/Options** button

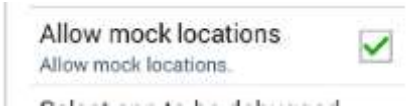
- Tap **Connect to Bluetooth GPS**



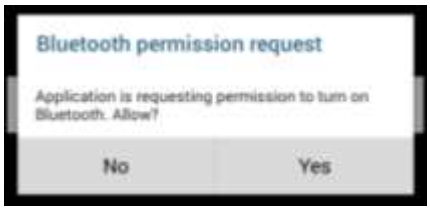
- If **Allow Mock Locations** is not enabled on Android device, will be prompted to turn on. Place check mark in box as shown below, then use back button on device to return to S1 Mobile app.

If you are unable to enable setting this due to BLM MaaS360 policy restriction, you must submit a Remedy help desk ticket: IT Services -> Mobile Device Support -> Request Now -> "What do you need help with?": Device Setup (MaaS360, Google Mail etc) -> "Do you need to change the device setup plan (MaaS360)?": Yes -> "Select the setup plan": GIS Device (Enable Mock Locations – Android Only).

Once waiver is granted, return to these instructions and continue configuration of receiver.



- If Android Bluetooth is off, respond **Yes** to turn on Bluetooth, then return to **Tools/Options** button and tap **Connect to Bluetooth GPS** to continue



- Tap **Pair a Device**

- Android Bluetooth Settings appear. Tap **Scan** if device is not listed under Available Devices; if it still doesn't appear after scanning, hold the power button down on the receiver for several seconds until blue light flashes rapidly (this puts device back into discoverable mode for 60 seconds), then scan again. The default name of Trimble R1 receivers is **GNSS:<last5digitsofserial#> (ex – GNSS:54735).**

- If device is listed under **Available Devices**, tap it to pair with Android device
- When pairing is successful, the device name will be listed under Paired Devices. Tap the device's Back button to return to S1 Mobile.

Enable Real-time Correction (WAAS/RTK) Settings

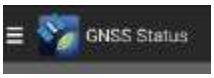
By default, the R1 is set to only use autonomous, uncorrected GPS positions to obtain a position fix. It may be desirable however to enable the device's ability to use real time corrections in the position fix. These corrections could come from WAAS (free) or RTK (paid subscription) signals. The device is configured using a separate application, called **GNSS Status**.

- In S1 Mobile app, tap **Setup Trimble Realtime**

- Google Play Store Opens, if app is not already installed, tap **Install** to install it on device, otherwise tap **Open**.

- At bottom of screen , choose **Select New Receiver**
- Choose the R1 from the list (ex – GNSS:54735), tap the connect icon

- App connects to device, tap **GNSS Status** in upper left corner, then choose **Real-time Config**



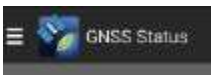
- If primary source = Uncorrected, select **EDIT** in upper right corner, tap on the Primary Source type and change to **SBAS**, this is WAAS in the United States. Then tap **SAVE**.
- Exit GNSS Status app
- Restart the device to clear connection with GNSS Status app

Enable NMEA Output Settings

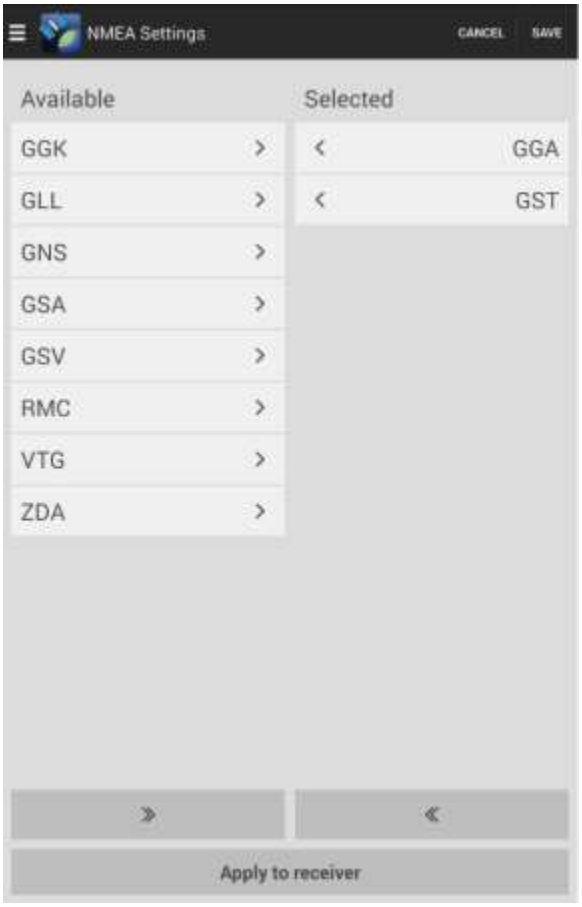
By default, the R1 does not output the necessary NMEA strings required for other applications to receive estimated accuracy values from the receiver. These NMEA strings can be enabled via the GNSS Status application. In order to enable NMEA output on R1 receiver, the receiver must have firmware version 5.03 or higher and GNSS Status app must be version 2.0.7 or higher.

It is assumed this application is still open from the previous step and that receiver is paired with device, if not launch the application and pair the device as shown in previous section.

- Tap **GNSS Status** in upper left corner, then choose **NMEA Settings**



- Under Available, tap **GGA and GST** to send them to the Selected side of screen



- Tap **Apply to Receiver**
- Under Select Port, tap **SPP1**

- Tap **Save**
- Close GNSS Status application

Pairing Trimble Geo 7x Handheld

Device is a sub-meter (in open canopy) receiver, capable of tracking GPS & GLONASS satellites, and can receiver WAAS and RTK corrections. Is a dedicated GPS receiver and data recorder, but its GPS signal stream can be output via Bluetooth and fed into an external data recorder (like an Android device). Doing so requires the installation of extra configuration software on the Geo Series device.

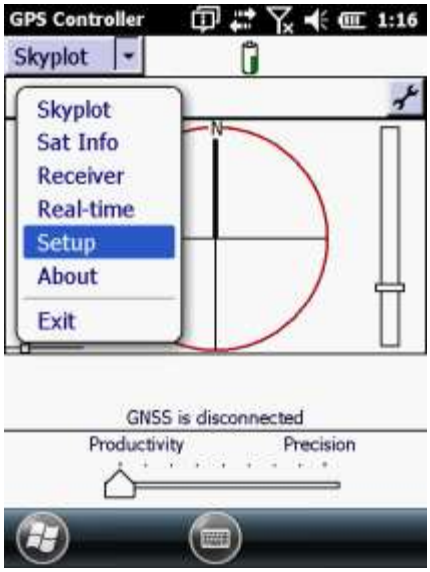
Trimble Geo 7x documentation: http://www.trimble.com/globalTRLTAB.asp?Nav=Collection-85271

- **Activate GPS** should be turned off in S1 Mobile application
- Turn on power to Trimble Geo 7x
- Windows Mobile Device Center (WMDC) must be installed on local PC

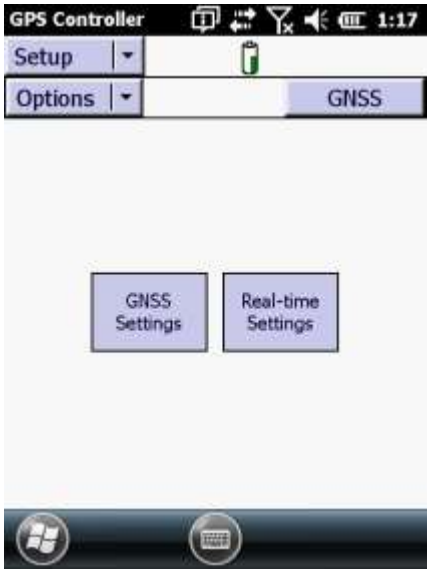
Setup: Install & Configure Software on Geo

- Download GPS Controller 2.70 & install
    - Download this file to PC, then copy to Geo via WMDC : \\blm\dfs\or\egis\projects\oso\Mobile_GIS\Android_Runtime_Project\BT_Receiver_Stuff\ Trimble GPS Controller 2.70.PPC600_StrongARM-XScale.PPC600_StrongARM-XScale.cab
    - Using File Explorer on Geo, navigate to location of file, tap on it to run it.
    - Follow install instructions, accepting all defaults
- Download GPS Connector & install (only for Geo6000, already installed on Geo7x):
    - Download this file to PC, then copy to Geo via WMDC : http://trl.trimble.com/dscgi/ds.py/Get/File-632978/GNSS%20Connector%20v1.2.1.CAB
    - Using File Explorer on Geo, navigate to location of file, tap on it to run it.
    - Follow install instructions, accepting all defaults
- Launch & configure GPS Controller (tap **Windows Start Menu-> GPS Controller**):

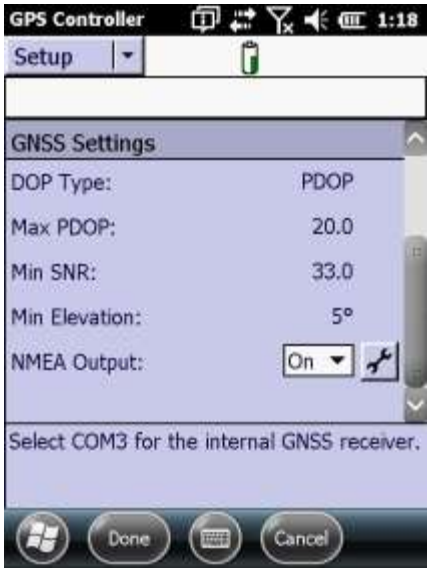
- Choose **Setup**



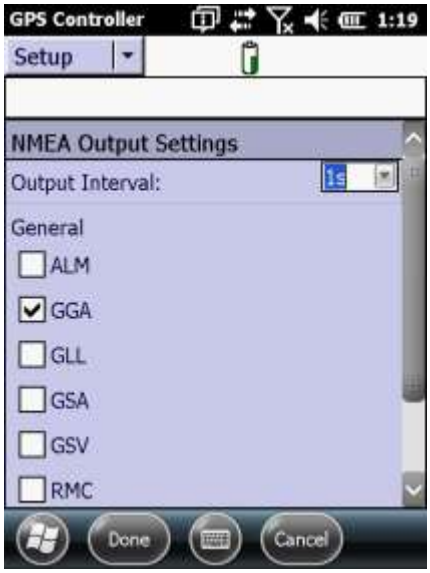
- Tap **GNSS Status**



- Set **NMEA Output** = On, then tap wrench icon



- Set **Output interval** = 1s, ensure only GGA is checked, and then tap Done.



- Tap **Real-time Setttings**, set **Choice 1** = Integrated SBAS, and then tap Done
- Tap **Exit**

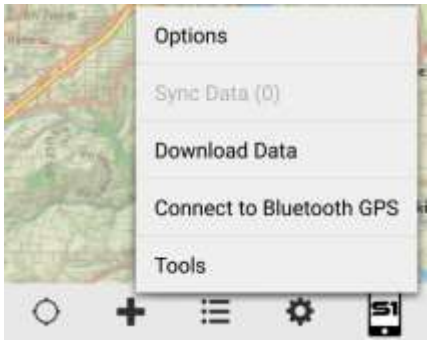
- Turn on Trimble BT: Tap **Windows Start Menu -> Settings -> Bluetooth**

- Tap **Mode** Tab -> Check **Turn on Bluetooth**, then tap **OK**

Setup: Create Bluetooth Pairing Between Geo & S1 Device

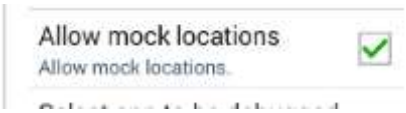
- In S1 Mobile app, tap **Tools/Options** button

- Tap **Connect to Bluetooth GPS**

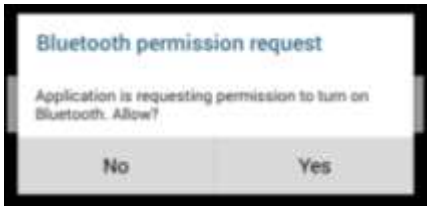


- If **Allow Mock Locations** is not enabled on Android device, will be prompted to turn on. Place check mark in box as shown below, then use back button on device to return to S1 Mobile app.

If you are unable to enable setting this due to BLM MaaS360 policy restriction, you must submit a Remedy help desk ticket, requesting : “Allow Mock Location policy exception waiver on Android device to allow connection of external GPS receiver to mobile device in support of high accuracy field data collection.” Once waiver is granted, return to these instructions and continue configuration of receiver.



- If Android Bluetooth is off, respond **Yes** to turn on Bluetooth, then return to **Tools/Options** button and tap **Connect to Bluetooth GPS to continue**



- Tap **Pair a Device**

- Android Bluetooth Settings appear. Tap **Scan** if device is not listed under Available Devices; if it still doesn't appear after scanning, hold the power button down on the receiver for several seconds until blue light flashes rapidly (this puts device back into discoverable mode for 60 seconds), then scan again. The default name of Trimble Geo receivers is **Geo<uniqueserial#> (ex – Geo5431443388).**

- If device is listed under **Available Devices**, tap it to pair with Android device
- When prompted, enter **0000** and tap **OK**

- On Trimble device, when prompted tap Yes to add the Android device to your Geo's device list

- Enter 0000 in passcode box then tap Next

- After seeing a **Device Added** message similar to the one below, tap **Done**

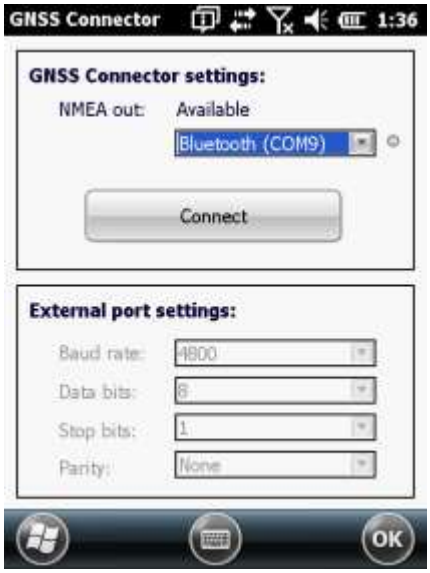
- On the Android device, when pairing is successful, the device name will be listed under Paired Devices. Tap the Android device's **Back** button to return to S1 Mobile.

Activate Bluetooth NMEA GPS Output on Geo

Assumption is that Geo's Bluetooth is already turned on, if not follow instructions from earlier step to turn on. The NMEA GPS Output step outlined here must be verified before each attempt to connect to Bluetooth GPS in S1 Mobile application.

- Turn on **GNSS Connector**: Tap **Windows Start Menu -> Settings -> Connections -> GNSS Connector**

- Choose **Bluetooth (COM9)** from list, your exact COM port # may differ from these instructions



- Tap **Connect** button

App must keep running, do NOT tap OK or the app will exit and the Bluetooth connection will be lost. It is alright to tap device's green home button to minimize application, but do NOT tap OK

Optional: It may be desirable to view the Geo's GPS Skyplot while its GPS stream is being fed to the S1 Mobile application via Bluetooth. If so, the GPS Controller application can be launched.

- On Geo, launch GPS Controller, tap **Windows Start Menu-> GPS Controller**:

- Tap **SkyPlot** from menu, GPS information will appear on screen as satellites come in contact with the Geo.

Due to restrictions imposed by Trimble software on Geo Series devices, the estimated accuracy value displayed in GPS Controller may not match the value provided to S1 Mobile application via Bluetooth. The most correct value will be found in the GPS Controller application.

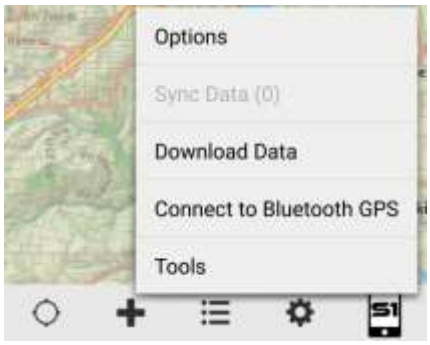
Pairing Garmin GLO Bluetooth Receiver

Device is a 2-5 meter (in open canopy) receiver, capable of tracking GPS & GLONASS satellites, and can receive WAAS corrections.

Garmin GLO Documentation: http://static.garmin.com/pumac//GLO_Instruc_Web_ML.pdf

- **Activate GPS** should be turned off in S1 Mobile application
- Turn on power to GLO
- First time pairing device: after powering device on LED will slow flash blue, this means searching for mobile devices, if no pairing occurs after several minutes, Bluetooth will turn off automatically. Users should turn device off and on to turn Bluetooth back on if this occurs.
- In S1 Mobile app, tap **Tools/Options** button

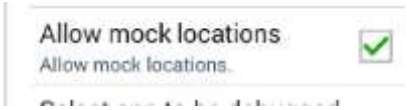
- Tap **Connect to Bluetooth GPS**



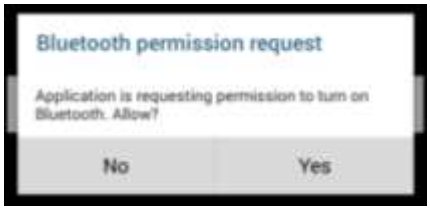
- If **Allow Mock Locations** is not enabled on Android device, will be prompted to turn on. Place check mark in box as shown below, then use back button on device to return to S1 Mobile app.

If you are unable to enable setting this due to BLM MaaS360 policy restriction, you must submit a Remedy help desk ticket, requesting : “Allow Mock Location policy exception waiver on Android device to allow connection of external GPS receiver to mobile device in support of high accuracy

field data collection." Once waiver is granted, return to these instructions and continue configuration of receiver.



- If Android Bluetooth is off, respond **Yes** to turn on Bluetooth, then return to **Tools/Options** button and tap **Connect to Bluetooth GPS** to continue



- Tap **Pair a Device**

- Android Bluetooth Settings appear. Tap **Scan** if device is not listed under Available Devices; if it still doesn't appear after scanning, hold the power button down on the receiver for several seconds until blue light flashes rapidly (this puts device back into discoverable mode for 60 seconds), then scan again.

- If device is listed under **Available Devices**, tap it to pair with Android device

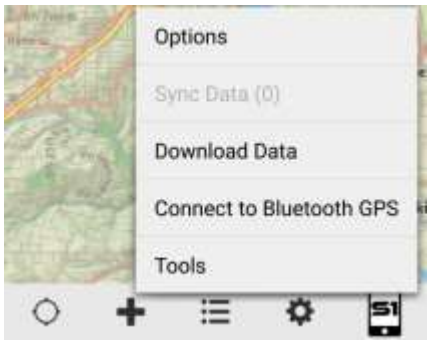
- When pairing is successful, the device name will be listed under Paired Devices. Tap the device's Back button to return to S1 Mobile.

Connecting to Paired Bluetooth Receiver in S1 Mobile

It is assumed that the both devices (Android & GPS receiver) are powered on & have Bluetooth turned on, Mock Location has been enabled on the Android device and both devices have been previously paired. If connecting a Geo Series device, it is also assumed that GNSS Connector has been activated on that device.

- Launch S1 Mobile, if not already open
- In S1 Mobile app, tap **Tools/Options** button

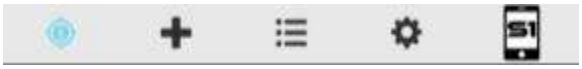
- Tap **Connect to Bluetooth GPS**



- Tap **List Paired Devices**

- Choose the preferred device from the list of paired devices to connect

- **Activate GPS** icon is replaced in the application by the **Activate Bluetooth GPS** icon

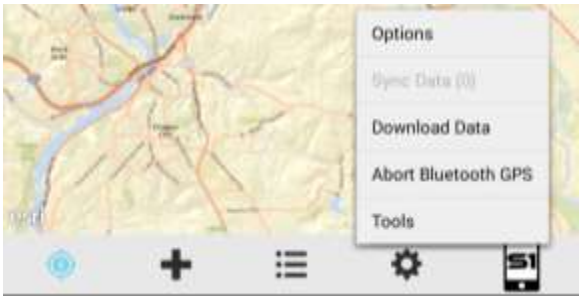


The connection to the Bluetooth device is being initialized, while this connection is being made, the GPS Status bar will display the following message. When it disappears, **Activate Bluetooth GPS** can then be tapped to turn on GPS location. Depending on the model of GPS receiver, this process can take several seconds to several minutes. Be in an area with optimal sky visibility to minimize the wait time.

- Once initialization is complete, tap **Activate Bluetooth GPS** to enable GPS location from the connected Bluetooth receiver

Disconnect Bluetooth Receiver/Return to Internal GPS

- If GPS Location is currently on, tap Activate GPS to turn off
- Tap **Abort Bluetooth GPS** to disconnect the Bluetooth GPS receiver



- If Activate GPS button is pushed now, application will use internal GPS instead of Bluetooth GPS

If the Bluetooth pairing was made with a Geo Series device, consider also disconnecting the NMEA GPS output stream on the Geo: tap **Windows Start Menu -> Settings -> Connections -> GNSS Connector -> Disconnect**