

Esri's ArcPad vs. ArcGIS Mobile vs. Trimble's TerraSync vs. TerraFlex Comparison

By: Electronic Data Solutions



ArcPad[®] is mobile field mapping and data collection software designed for GIS professionals. It includes advanced GIS and GPS capabilities for capturing, editing and displaying geographic data and allows one to use customized data entry forms designed in ArcPad Studio or through other methods. The strength of ArcPad is its integration with ArcGIS[®] Desktop through an easy checkout/check-in process. Maps in ArcPad can use the same symbology, zoom tolerances, labels, etc. as ArcMap allowing the map in the field to mirror the map in the office. Modifications to the out-of-box software are easy to make for programmers and non-programmers alike.

Trimble[®]'s TerraSync[™] Professional is a full-featured yet flexible data collection and data maintenance software package designed to work seamlessly with Trimble receivers and Pathfinder Office or Trimble Positions Desktop Add-in for ArcGIS. Data dictionaries are easily set up in Pathfinder Office to ensure consistent, efficient data collection through time-saving features such as attribute pick lists and conditional attributes. Trimble also offers a lower-priced version of TerraSync (Standard edition), which is an ideal solution for collecting new GIS data without background file support or data maintenance functionality.

ArcGIS for Windows[®] Mobile is a user-friendly, task-driven mobile GIS software. ArcGIS Mobile includes an out-of-the box Windows[®] Mobile client, Windows client, software SDK, Mobile Project Center, and Mobile geoprocessing tools. ArcGIS Mobile is designed to work primarily with synchronization to ArcGIS Server (Enterprise Advanced Edition), making data updates instantly available to field staff as well as everyone in the office. An optional mobile cache workflow is available for disconnected editing.

TerraFlex[™] is Trimble's first Mapping & GIS software to be compatible with Windows Mobile, Android, and iOS devices. The office software is hosted in the Cloud, and field data is automatically synced with a central server for real-time access to the latest data. It consists of editable forms that can be deployed to all users or to select individuals. It has a simple user-interface that requires minimal training. TerraFlex is a great software for companies that are just starting to enter the GPS/GIS world or ones that have a 'bring your own device' policy. An optional TerraFlex ArcMap Plugin or Trimble Positions Desktop add-in is now available for a direct ArcMap workflow.

Hardware Support							
	ArcPad 10.2x	TerraSync 5.8x			ArcGIS Mobile 10.2x	TerraFlex Jan. 2016	
		Standard	Professional	Centimeter*	Standard Application	Basic	Advanced
Windows Mobile support	Windows Mobile 5 and 6.x	Windows Mobile 5 and 6.x			Windows Mobile 5 and 6.x	Windows Mobile 6.5	
PC and Tablet (Trimble Yuma) support	Windows XP, Vista and Windows 7	Windows XP, Vista and Windows 7/8			Windows XP, Vista, and Windows 7	iOS, Android, Window 7/8(Yuma 2 and Motion Tablets only)	

Software features							
	ArcPad 10.2x	TerraSync 5.8x			ArcGIS Mobile 10.2x	TerraFlex Jan. 2016	
		Standard	Professional	Centimeter*	Standard Application	Basic	Advanced
In-field map display	Yes	Yes			Yes	Yes	
Background vector map display	Yes	No	Yes	Yes	Yes	No	
Vector format	.shp, .axf	.ssf,	.ssf, .cor, .imp, ¹ .shp	.ssf, .cor, .imp, .shp	Mobile cache	None	
ArcGIS Online Basemap support	Yes	No			Yes	No	
Background image map display	Yes	No	Yes	Yes	Yes	Yes	
Background image format	GIF, JPEG, JPEG2000, MrSID, PNG, TIFF, .bmp, CADRG	None	JPEG, JPEG2000, MrSID, bmp . TIFF, ECW	JPEG, JPEG2000, MrSID, .bmp, TIFF, ECW	Mobile cache	Google Maps and Imagery ESRI Maps and Imagery	
Coordinate Systems	Lat/Long, UTM , State Plane, hundreds more	Lat/Long, UTM , State Plane, hundreds more			Lat/Long, UTM , State Plane, hundreds more	Lat/Long	
Customized User Interface ²	Yes	Yes			Yes	No	
External Sensor Support ³	Yes	No	Yes	Yes	Yes	No	
Relational Tables Support	Yes	No			No	No	
Quick Project Creation	Yes	Yes			No	No	
Synchronize with ArcGIS Server ⁴	Yes	No			Yes	No	
Cloud based workflow	No	No			Optional	Yes	

* TerraSync Centimeter edition for data collection and maintenance using Land Surveying receivers (receivers must be running firmware version 4 or later). Supported Land Surveying receivers include: Trimble R8 receiver (Models 2 & 3), Trimble R6 receiver (Models 1 & 2), Trimble R4 receiver, and Trimble 5800 receiver (Model 2).

¹ TerraSync Professional uses Trimble's native .SSF format as well as reading/writing shapefiles. Pathfinder Office can Import .shp, .dxf, .mif, .dbf, and .gdb files to create an .imp file for use as a background layer or for Data Maintenance.

² The ArcPad Toolbar Manager that is included with ArcPad allows users to customize toolbars and create their own. ArcStudio can be used to create custom tools and forms for use in ArcPad. TerraSync Studio is now available in Pathfinder Office 5.x, and can be used to customize the TerraSync user Interface. ArcGIS Mobile include an SDK for custom scripting.

³ TerraSync Professional and ArcPad can read data from an external sensor such as a barcode scanner, tree caliper or water quality instrument. ArcPad requires scripting to use the external sensor data; TerraSync can be configured without any programming. ArcGIS Mobile does not support external sensors except in the SDK and with the Trimble Positions Mobile Extension.

⁴ ArcPad 10 can synchronize directly with ArcGIS Server. This requires connection to the server, either through ActiveSync connection to the network, or Internet connectivity in the field. Data must be stored in AXF, and the ArcPad Extension for ArcGIS Server must be installed on the server. ArcGIS Mobile can synchronize directly with ArcGIS Server. ArcGIS Server Enterprise Advanced Edition is required in both instances.

GPS Support							
	ArcPad 10.2x	TerraSync 5.8x			ArcGIS Mobile 10.2x Standard Application	TerraFlex Jan. 2016	
		Standard	Professional	Centimeter*		Basic	Advanced
Supported GPS Protocols ⁵	NMEA, TSIP, SiRF, Earthmate, Rockwell		TSIP, SiRF		NMEA	TSIP, iOS, Android	
Real-time DGPS ⁶	Yes		Yes		Yes	Yes	
Satellite Based Augmentation System (SBAS) Support ⁷	Yes		Yes		Yes	Yes	
Virtual Reference Station (VRS) Support ⁸	Yes ⁸		Yes		Yes ⁸	Yes	
Post-processed GPS ⁹	Yes ⁹		Yes		Yes ⁹	No	
Navigation	Yes		Yes		Yes	No	Yes
Data Quality Filters ¹⁰	Yes		Yes		Yes	No	

Data Collection							
	ArcPad 10.2x	TerraSync 5.8x			ArcGIS Mobile 10.2x Standard Application	TerraFlex Jan. 2016	
		Standard	Professional	Centimeter*		Basic	Advanced
Feature Collection ¹¹	Yes		Yes		Yes	Yes	
Attribute Collection ¹²	Yes		Yes		Yes	Yes	
Real-time Data Sync	No		No		Yes	Yes	

⁵ ArcPad will support not a specific receiver but a specific protocol. This means that ArcPad will operate with ANY GPS receiver that outputs the NMEA, TSIP, Delorme Earthmate binary protocol, SiRF, or Rockwell PLGR binary protocol. See compatibility chart for Trimble receivers compatible with TerraSync, GPSCorrect and Trimble Positions. ArcGIS Mobile supports only NMEA GPS connections.

⁶ GPSCorrect, Trimble Positions, or GPS Controller is required to configure real-time corrections for ArcPad. GPS Controller or some other manufacturer-specific receiver utility is required to configure corrections for ArcGIS Mobile. Real-time configurations can be done directly in TerraSync.

⁷ SBAS is a general term referring to any satellite-based augmentation system. The [International Civil Aviation Organization](#) (ICAO) rules an SBAS must transmit a specific message format and frequency which matches the design of the United States' [Wide Area Augmentation System](#) (WAAS). Among Trimble MGIS receivers, only the Pathfinder XC Card does not currently support SBAS.

⁸ VRS is supported in GPSCorrect™ for ArcPad and Trimble Positions ArcPad extension for ArcPad and Mobile.

⁹ TerraSync uses Pathfinder Office or GPS Analyst and base station data to post-process GPS and DGPS positions. Post-processing in ArcPad requires Trimble's GPSCorrect for ArcPad extension or Positions ArcPad extension, using a Trimble receiver and Pathfinder Office, GPS Analyst, or Trimble Positions Desktop add-in software. Post-processing in ArcGIS Mobile requires Trimble's Positions Mobile extension, using a Trimble receiver and Pathfinder Office or Trimble Positions Desktop add-in software.

¹⁰ Data quality filters include real-time status, elevation mask, SNR mask, PDOP mask, HDOP Mask, and so on. ArcPad cannot set SNR mask, elevation mask, or HDOP mask. These can be set in GPSCorrect for ArcPad. ArcGIS Mobile can filter based on PDOP and processing method only; settings must be configured in Mobile Project Center.

¹¹ All software packages support feature collection of points, lines, and areas. TerraSync uses Trimble's Data Dictionary created by Pathfinder Office or within TerraSync, so a new feature of any type can easily be created. ArcPad requires that you load or create layers, make a layer editable, edit or create features, make another layer editable, etc. Mobile requires a cached project to be created in Mobile Project Center.

¹² ArcPad utilizes forms for attribute entry, which are created by checking data out of a geodatabase using the ArcPad Data Manager. ArcPad also includes a QuickForm feature for on-the-fly form creation, as well as ArcPad Studio for creating and modifying data entry forms. TerraSync uses a Data Dictionary created in Pathfinder Office or within TerraSync. The Mobile Project Center for ArcGIS Mobile can be used to configure some data entry form options, such as visible fields.

GIS Support							
	ArcPad 10.2x	TerraSync 5.8x			ArcGIS Mobile 10.2x Standard Application	TerraFlex Jan. 2016	
		Standard	Professional	Centimeter*		Basic	Advanced
Export to Other GIS Formats ¹³	Yes	Yes			Yes	Yes	
Export to Different Coordinate System ¹⁴	Yes	Yes			Yes	No	
Data Dictionary Support ¹⁵	No	Yes			No	No	
Conditional Attribute Support ¹⁶	No	Yes			No	No ¹⁷	Yes
Graphical Attribute Support ¹⁸	No	Yes			No	Yes	
Laser Rangefinder Interface (GPS offsets) ¹⁹	Yes	No	Yes	Yes	Yes	Yes	
Control of integrated camera ²⁰	Yes	Yes			Yes	Yes	
Continue (Nest Point)	Yes	Yes			Yes ²¹	Yes	
Segment Line Features ²²	Yes	Yes			No	No	
Vertex/Point Averaging ²³	Yes	Yes			Yes	No	
Data Maintenance							
	ArcPad 10.2x	TerraSync 5.8x			ArcGIS Mobile 10.2x Standard Application	TerraFlex Jan. 2016	
		Standard	Professional	Centimeter*		Basic	Advanced
Update Attributes	Yes	No	Yes	Yes	Yes	No	Yes ²⁴
Update Positions	Yes	No	Yes	Yes	Yes	No	Yes ²⁴
Filtering & Sorting	No	No	Yes	Yes	Yes	Yes ²⁵	
Feature Snapping	Yes	No			Yes	No	
Direct Read/Write to .shp	Yes	No	Yes	Yes	No	No	
Digitizing Capability ²⁶	Yes	Yes			Yes	Yes	

¹³ Exporting to other formats requires ArcGIS Desktop in the case of ArcPad or ArcGIS Mobile and Pathfinder Office (if a format other than a shapefile is needed) in the case of TerraSync. TerraFlex can export through the TerraFlex cloud or ArcGIS Desktop when using the TerraFlex ArcMap Plugin or Positions Desktop add-in.

¹⁴ Requires support software. ArcToolbox™ projection tools support conversion to dozens of standard coordinate systems as well as custom coordinate systems. Pathfinder Office exports to any of the above formats in dozens of coordinate systems and also allows custom coordinate system definition.

¹⁵ Attribute pick lists and range checks can be set up in a geodatabase in ArcCatalog before checking the data out to ArcPad. A Form created in ArcPad Studio or ArcPad Quick Form can be used to create data entry rules.

¹⁶ Pathfinder Office 5.0 and later can create data dictionaries with conditional attributes for TerraSync 5.0 and later. ArcEditor can create subtypes, which support conditional attribute entry. ArcGIS Mobile will treat subtypes as separate feature types.

¹⁷ TerraFlex Basic has limited conditional attributes. For more conditional attributes, you must update to the Advanced version.

¹⁸ Images associated with a particular attribute can be chosen from a folder instead of only having the dropdown menu.

¹⁹ Allows use of laser rangefinders for creating GPS offsets. Check software documentation or speak with a dealer to find supported laser rangefinders. ArcGIS Mobile must have Trimble Positions Mobile Extension to use laser rangefinders.

²⁰ ArcPad will link features to digital images, videos, or Web pages. TerraSync will link any file type. Attachments are used in ArcGIS Mobile to attach any file type.

²¹ The Trimble Positions extension 10.2.0.1 or greater is required for this option.

²² Allows line features to be recorded as many segments that are joined together, but may have different attribute values, such as a road that is paved/ unpaved in different sections.

²³ Ability to average multiple point positions or multiple vertex positions in a line/area. This results in higher data accuracy as several points are averaged and the most accurate position is selected as the point/vertex.

²⁴ Existing data can be moved from the TerraFlex Cloud or TerraFlex ArcMap Plugin to the field with Advanced version. Existing data cannot currently be transferred to the field from the Positions Desktop add-in.

²⁵ Limited filtering in the TerraFlex Cloud.

²⁶ Create positions for a feature by selecting location on the map. A line or area can contain both GPS and digitized positions.

Conclusions.

ArcPad is a great tool for any field GIS operation, including in-field decision making, GIS data update, and GIS data collection. Data collection forms make data collection easy and full-featured. GPScorrect or Positions for ArcPad makes all your GPS data post-processable for the greatest accuracy and allows direct receiver control and real-time configuration. If you are familiar with ArcGIS®, you will feel right at home with ArcPad. The multi-layer environment and extensibility make it a great value at \$700 (or \$1,195 with GPScorrect or Trimble Positions ArcPad Extension).

For collecting GPS data and updating attributes as well as positions, TerraSync Professional can't be beat for ease of use and functionality. For those who already own Trimble receivers and Pathfinder Office software, TerraSync Professional is a good value at \$1,295. TerraSync Centimeter includes all the functionality of TerraSync Professional but allows for connecting to centimeter grade receivers at a cost of \$2,995. For users who are only interested in collecting new GPS data without background images or external devices, TerraSync Standard is an excellent choice for \$295.

ArcGIS Mobile is designed for task-based data collection and integration with ArcGIS Server. For those who already have ArcGIS Server Enterprise Advanced Edition, ArcGIS Mobile fits in as a part of the enterprise solution. For ArcGIS Desktop users, ArcGIS Mobile is available as an alternative for simple data collection. You may have a single license available with the purchase of ArcGIS Desktop 10.x (or \$495 with the Trimble Positions Mobile Extension).

TerraFlex is a simple mapping software that is geared to those entering the GPS/GIS world. It's easy to maintain and distribute work to field crews. The low cost and wide range of compatible devices makes it functional for many small operations or others with tight budgets. It is subscription based and requires a yearly fee of \$250 per user for Basic Edition and \$400 per user for Advanced Edition.

For pricing on a GIS/GPS solution featuring the Yuma series, Nomad, Juno series, Geo Series, Pathfinder Pro6T, Pro6H, ProXRT, Juniper Systems' Archer 2, Mesa, or Allegro 2 with TerraSync, ArcPad, ArcGIS for Windows Mobile or TerraFlex software, contact Electronic Data Solutions at (208) 324-8006. Educator, GSA and BPA prices are also available on most models.

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