

Esri®'s ArcPad® vs. ArcGIS® Mobile vs. Trimble®'s TerraSync™

A Product Comparison
by Electronic Data Solutions

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ArcPad is the most popular of Esri's mobile GIS and field mapping software family. This software is quite popular due to its low cost (around \$700), portability, integration with ArcGIS®, and ability to work with GPS, laser rangefinders and cameras for navigation and data capture or update in the field. Esri has positioned this product as 'the world's leading software package for mobile GIS. It supports a multilayer environment with industry-standard vector and raster support, similar to ArcGIS. It works directly in shapefile or AXF (ArcPad Exchange Format, based on SQLce) format and allows one to use customized data entry forms designed in ArcPad Studio or through other methods. ArcPad supports a wide range of ArcGIS symbols and stylesheets, enabling maps to mirror the appearance of those in ArcGIS.

ArcGIS Mobile is a user-friendly, task-driven mobile GIS software. ArcGIS Mobile 10 includes an out-of-the box Windows Mobile client, Windows client, and software SDK. ArcGIS Mobile is designed to work primarily with ArcGIS Server (Enterprise Advanced Edition). However, at ArcGIS 10, a single license of ArcGIS Mobile also ships with ArcGIS Desktop. ArcGIS Mobile does not support related tables, laser rangefinders, post-processing, or editing existing feature geometry.

Trimble's TerraSync Professional is a full-featured yet flexible data collection and data maintenance software package designed to work seamlessly with Trimble's Pathfinder® receivers and Pathfinder Office or GPS Analyst™ extension 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. TerraSync supports data collection with receivers ranging from the GPS Card edition through the GeoExplorer handheld to H-Star™ receivers with sub-foot accuracy, and even Trimble RTK systems. *Note: TerraSync 4.13 and later no longer support the 2003 Pocket PC operating system.* Laser Rangefinders are supported when performing GPS offsets of point features. Other external sensor data can also be integrated with GPS data in TerraSync. Background maps can be displayed for visual orientation. Time saving tools such as repeating feature attributes and continuing features will make you more efficient in the field. 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.

		ArcPad 10	ArcPad 8	TerraSync 5.20 Professional Standard		TerraSync 5.20 Centimeter*	ArcGIS Mobile 10.0 Standard Application
Hardware support	Windows Mobile support	Windows Mobile 5 and 6.x		Windows Mobile 5 and 6.x		Windows Mobile 5 and 6.x	Windows Mobile 5, 6.0, 6.1
	PC and Tablet (Trimble Yuma) support	Windows XP, Vista and Windows 7		Windows XP, Vista and Windows 7		Windows XP, Vista and Windows 7	Windows XP, Vista, and Windows 7
Software features	In-field map display	Yes		Yes		Yes	Yes
	Background vector map display	Yes		Yes	No	Yes	Yes
	Vector format	.shp, .axf		.ssf, .cor, .imp ¹ , .shp	.ssf	.ssf, .cor, .imp, .shp	Mobile cache
	ArcGIS Online Basemap support	Yes	No	No	No	No	Yes
	Background image map display	Yes		Yes	No	Yes	Yes
	Background image format	GIF, JPEG, JPEG2000, MrSID, PNG, TIFF, .bmp, CADRG		JPEG, JPEG 2000, MrSID, bmp, TIFF, ECW	None	JPEG, JPEG 2000, MrSID, .bmp, TIFF, ECW	Mobile cache
	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, UTM, State Plane, hundreds more
	Customized User Interface ²	Yes		Yes		Yes	Yes
	External Sensor Support ³	Yes		Yes	No	Yes	No
	Support for Relational Tables	Yes		No		No	No
	Quick Project Creation	Yes		Yes		Yes	No
	Synchronize with ArcGIS Server ⁴	Yes		No		No	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 .mdb 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, and can be used to customize the TerraSync user Interface. The Mobile Project Center is used to configure a mobile project for ArcGIS Mobile.

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.

⁴ ArcPad 8 and 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.

		ArcPad 10	ArcPad 8	TerraSync 5.20 Professional	TerraSync 5.20 Standard	TerraSync 5.20 Centimeter	ArcGIS Mobile 10.0 Standard Application
GPS Support	Supported GPS Protocols ⁵	NMEA, TSIP, SiRF, Earthmate, Rockwell		TSIP, SiRF		TSIP, SiRF	NMEA
	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	No		Yes		Yes	No
	Post-processed GPS ⁹	No		Yes		Yes	No
	Navigation	Yes		Yes		Yes	No
	Integration with Copilot or TomTom	No		No		No	No
	Data Quality Filters ¹⁰	Yes		Yes		Yes	Yes
	Loss of DGPS Warning	Yes		Yes		Yes	Yes
Data Collection	Feature Collection ¹¹	Yes		Yes		Yes	Yes
	Attribute Collection ¹²	Yes		Yes		Yes	Yes
	Data Dictionary Support ¹³	No		Yes		Yes	No

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. TerraSync will work with the following receivers that can output the TSIP or SiRF protocol: the Yuma[®], Nomad[®], Juno[™], Trimble GeoExplorer[®] series, Pro XR/XRS, XH[™], XT[™], XB and XRT. It also supports the Trimble GPS XC Card when used in a Trimble Recon[®] or Ranger[™] or Juniper Archer Field PC[®] handheld. ArcGIS Mobile supports only NMEA GPS connections.

⁶ GPSCorrect[™] 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.

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, using a Trimble receiver and Pathfinder Office or GPS Analyst 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.

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.

¹³ 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.

		ArcPad 10	ArcPad 8	TerraSync 5.20		TerraSync 5.20	ArcGIS Mobile 10.0
				Professional	Standard	Centimeter	Standard Application
	Conditional Attribute Support ¹⁴	Yes		Yes		Yes	No
	Graphical Attribute Support ¹⁵	No		Yes		Yes	No
	Laser Rangefinder Interface (GPS offsets) ¹⁶	Yes		Yes	No	Yes	No
	Control of integrated camera and other hyperlinks ¹⁷	Yes		Yes		Yes	No
	Velocity Data Filter	No		Yes		Yes	No
	Continue (Nest Point)	Yes		Yes		Yes	No
	Segment Line Features ¹⁸	Yes		Yes		Yes	No
	Vertex/Point Averaging ¹⁹	Yes		Yes		Yes	Yes
Data Maintenance	Update Attributes	Yes		Yes	No	Yes	Yes
	Update Positions	Yes		Yes	No	Yes	No
	Filtering & Sorting	No		Yes	No	Yes	Yes
	Status Flags (New, Imported, Updated)	No		Yes	No	Yes	No
	Feature Snapping	Yes		No		No	No
	Direct Read/Write to Shapefile	Yes		Yes	No	Yes	No
	Digitizing Capability ²⁰	Yes		Yes		Yes	Yes
GIS Support	Export to Other GIS Formats ²¹	Yes		Yes		Yes	Yes
	Export to Different Coordinate System ²²	Yes		Yes		Yes	Yes

¹⁴ 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.

¹⁵ Images associated with a particular attribute can be chosen from a folder instead of only having the dropdown menu.

¹⁶ Allows use of laser rangefinders for creating GPS offsets. Check software documentation or speak with a dealer to find supported laser rangefinders.

¹⁷ ArcPad will link features to digital images, videos, or Web pages. TerraSync will link any file type.

¹⁸ 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 and unpaved in different sections.

¹⁹ 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.

²⁰ Create positions for a feature by selecting location on the map. A line or area can contain both GPS and digitized positions.

²¹ 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.

²² 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.

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 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).

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 survey 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.

For pricing on a GIS/GPS solution featuring the Yuma, Nomad, Juno SB/SC, GeoXM, GeoXT, GeoXH, Pathfinder ProXT or XH, ProXRT, Juniper Systems' Archer with GPS Card or the new Mesa with TerraSync or ArcPad software, contact Electronic Data Solutions at (208) 324-8006. Educator and GSA prices are also available on most models.
