

FAQ

ERDAS TITAN 2009

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1. What is ERDAS TITAN?

ERDAS TITAN is an innovative data sharing solution, enabling users and organizations to publish, access, discover and ultimately consume geospatial data, web services and location-based content, all in one online, dynamic, collaborative network. ERDAS TITAN is a geospatial data bridge, providing access to unlimited public and private data resources, and enabling that data to be accessed in a variety of desktop, internet and 3D virtual globe applications in use on the desktop.

Blending social networking and community sharing concepts, ERDAS TITAN is relevant for a broad audience of geospatial users and organizations who desire to share, discover and access data, directly with other users, within workgroups and also publicly. The ERDAS TITAN Network supports access to geospatial data while ensuring digital ownership rights are retained.

2. What are available ERDAS TITAN products and components?

2.a. ERDAS TITAN Client

The ERDAS TITAN Client is used to engage with individuals and communities on the ERDAS TITAN Network. It is freely downloadable and distributable from www.erdas.com/titan. The ERDAS TITAN Client comprises the following two components:

2.a.i. Geospatial Instant Messenger

This application implements a communications protocol allowing users within the ERDAS TITAN Network to publish, chat, search, discover, access and ultimately visualize and retrieve geospatial data and web services. Using this interface, users click and drag the data that they want to share into the 'MyData' folder and set permissions to publish to the ERDAS TITAN Network. Subsequently, other users are able to discover and access that data.

Via the Geospatial Instant Messenger, geospatial data and web services shared by others on the ERDAS TITAN Network are consumed into a variety of desktop, Internet and 3D virtual globe applications. TITAN enables those datasets to be streamed from user to user and ultimately into these various client applications.

Data published using the Geospatial Instant Messenger also automatically creates an OGC Web Map Service (WMS). WMS Server capability is embedded in the ERDAS TITAN Client and runs on the local machine. The dataset(s) published may then be consumed directly by any desktop application with the ability to read (consume) a WMS (this includes OGC Web Client Applications, ERDAS Imagine, ArcMap, uDig, Quantum GIS, Manifold, GeoMedia, Autodesk etc).

2.a.ii. ERDAS TITAN Viewer

This is a free web-based application that enables a global network of users to interactively visualize and share data. The Viewer features a 3D virtual globe, and base imagery for the globe is streamed from the GlobeExplorer data store located in Walnut Creek, California. Users are enabled to add their own local data (images, web services, notations, screenshots, 3D models, features) and save a 'MyWorld', an interactive 3D presentation space that is shared with other users.

2.b. ERDAS TITAN GeoHub

A GeoHub enables organizations to create their own secure community within the ERDAS TITAN Network (or any isolated network, see Master Server). A GeoHub enables both internal and external permission-based data access and distribution within a secure network. In a GeoHub environment, participants are 'subscribers' to the GeoHub. The GeoHub is managed by an Administrator who performs functions including authenticating users, creating groups, setting policies (share/no share), generating reports, and more.

2.c. ERDAS TITAN Master Server

Some organizations want to replicate the ERDAS TITAN Network, but require operating separately as their own isolated network. An ERDAS TITAN Master Server enables any organization to deploy an autonomous network. The Master Server acts as a registry service, or master user management system, for all the GeoHubs and individual users on a network. The Master Server handles all GeoHub and individual registrations and takes login requests for the entire network. The Master Server also manages all user profile and subscription data, and enables all communication between GeoHubs and individual users for an entire network.

An network must be comprised of one Master Server and at least one GeoHub.

2.d. ERDAS TITAN Web Cache Server

ERDAS TITAN Web Cache Servers may be setup on separate machines to improve the performance of a GeoHub. Web Cache Servers may be set up in different geographic locations than the GeoHub they serve, ultimately provide scalability for data sharing for a GeoHub. A GeoHub may be supported by an unlimited number of web cache servers.

There are several factors that come into play when determining the scalability of a GeoHub, and each factor can have some effect on the user experience when connected to the GeoHub.

- Transaction Volume – the number of dataset requests made each second
- Request Variability – a measure of how many of the requests made of the GeoHub are for the same dataset
- Connected Users – the active number of users on the GeoHub
- Bandwidth – the amount of data that can be sent in a given period of time
- Geography – physical distance from data

3. What Problems does ERDAS TITAN solve?

- Provides one secure source for discovering, viewing and retrieving geospatial data, web services and location-based information. The Internet has thousands of web sites where users can download and access data and web services. ERDAS TITAN offers a one-stop shop where users can find, view and access geospatial data
- Promotes rapid sharing of content amongst users, without requiring expensive server technology
- Enables consumption of data into a variety of client applications, including desktop, Internet and 3D virtual globe applications
- Supports the consumption of geospatial data based on standard geospatial OGC web services, including WMS, WCS and catalogs of metadata to search and discover data layers as web services (EAIM Catalog)
- Moves away from static 2D web sites to a 3D virtual globe with high performance
- Allows interactive communication and collaboration within a network of users and communities
- Enables users to view other people's MyWorlds, interacting with geospatial data, web services and location-based content
- Empowers a local geospatial author of content to become a server of content
- Enables sharing geospatial data and content while the data owner retains digital ownership rights (i.e. hosting by a third party is not required)

4. ERDAS TITAN Network

4.a. What is the ERDAS TITAN Network?

The ERDAS TITAN Network is an online, collaborative network of authors and consumers of geospatial data, that may share (publish and retrieve) content within a secure global network of users. The ERDAS TITAN Network enables participants to share, discover, access, visualize, and ultimately retrieve geospatial data, web services and location-based content.

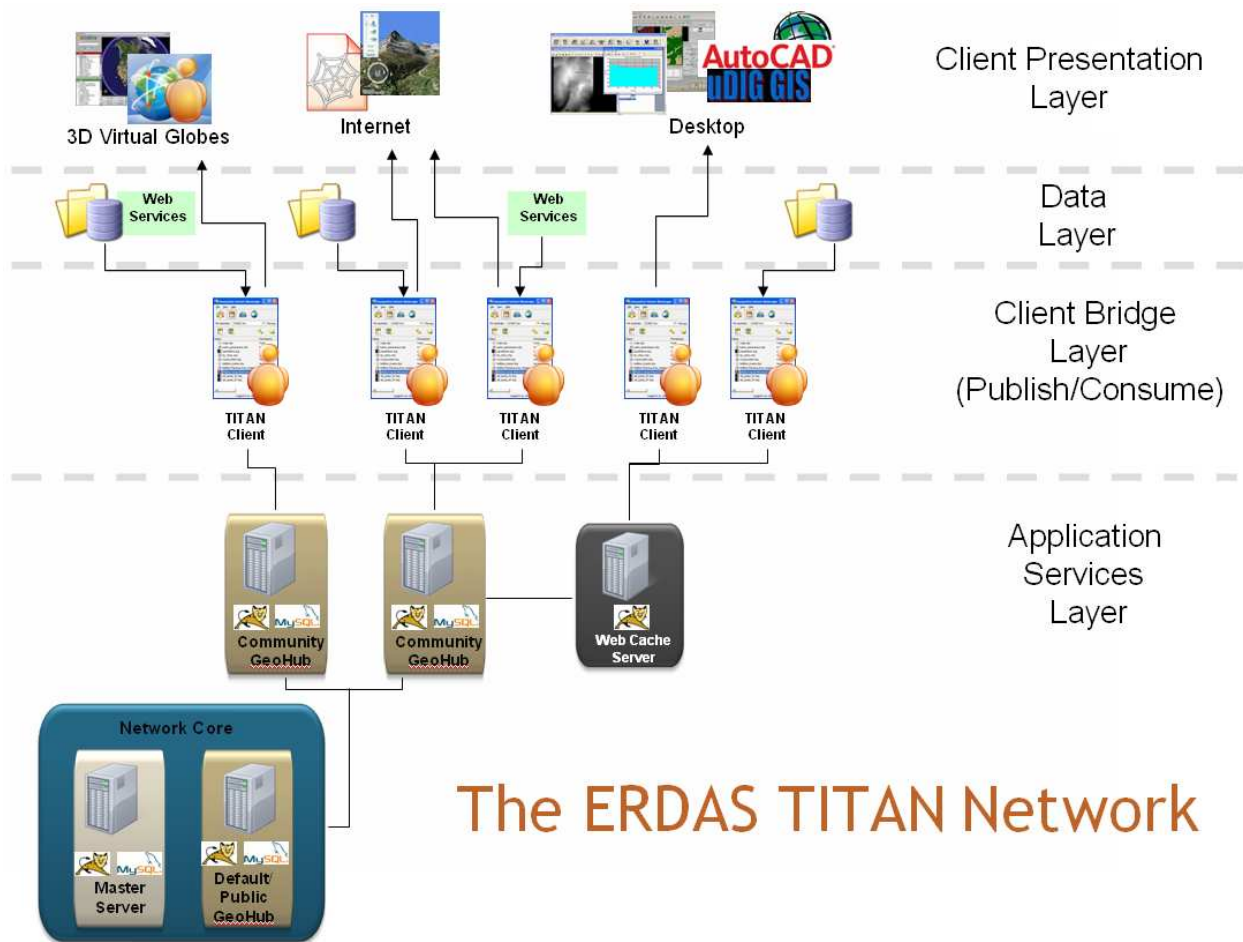
The diagram below shows the afore mentioned ERDAS TITAN products and their role in the ERDAS TITAN Network:

ERDAS TITAN Client: geospatial data bridge that enables users to publish, discover, access and consume data; TITAN Client is both publishing and consuming mechanism, enabling users to take data 'sideways' into other client applications in use on the desktop

ERDAS TITAN Master Server: one master registry for the entire network; handles all GeoHub and user registrations and takes all login requests

ERDAS TITAN GeoHub: enables permission-based data access both internally and externally for an organization; managed by an Admin who creates all subscribers and their data sharing and consumption capabilities

ERDAS TITAN Web Cache Servers: provide scalability, enhancing performance of a GeoHub



The ERDAS TITAN Network

4.b. How do I Join the ERDAS TITAN Network?

You can join the ERDAS TITAN Network by downloading and installing the TITAN Client and ultimately creating an ERDAS TITAN Passport. You will need to click 'Register' to open up the Passport dialog box, where you create a username and password.



4.c. Who participates in ERDAS TITAN Network?

Government Organizations that have a mandate to author and share geospatial data and web services across departments and to the general public, including:

- Local & Regional
- State (including GIS Data Clearinghouses)
- Federal (Civilian, Defense, NMA)

Geospatial Data and Service Providers who create, market and sell geospatial data and services to the consumer public.

Consumers who use geospatial data and consume web services for a variety of vertical market applications.

Emergency Management/Disaster Response: ERDAS TITAN is utilized in a disaster to rapidly enable multitudes of stakeholders to dynamically publish and consume geospatial data and location-based content in one online, collaborative network.

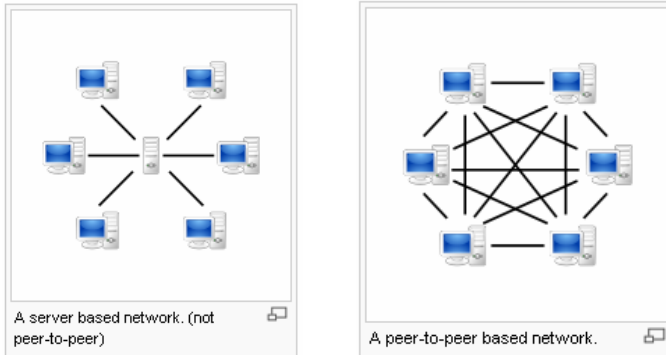
6. What are some of the things you do with ERDAS TITAN?

- Discover and access data shared by other users, and select which data they would like to visualize and retrieve via streaming geospatial web services
- Create a MyWorld—a geographically-enabled interactive 3D space—where they can upload geospatial data, web services and location-based content, set permissions, and share content with other network users
- Consume and visualize data in a variety of client applications
- Add metadata and define data tags making it easy for other users in the ERDAS TITAN network to find data
- Engage in real time discovery, access, publishing and communication among ERDAS TITAN Network participants
- Access data published to the ERDAS TITAN Network from any OGC WMS compliant application
- Participants can consume OGC web services, including WMS and WCS and also non-OGC web services such as ECWP image streaming protocol
- Participants can query a catalog of metadata to return data layers as OGC compliant web services

6. Is ERDAS TITAN built on a Peer to Peer network technology?

No. Although the ERDAS TITAN user's experience resembles a Peer to Peer (P2P) network experience (sharing, discovering, accessing data within a network of users), by definition it is not. In ERDAS TITAN, clients rely on a proxy server (GeoHub™) as a middleman for all communication, indexing, access and data streaming. This is known as a 'star' system, where communication and engagements are made to and from a central server. Alternatively, a P2P

network protocol is known as a 'mesh' system, where clients interact directly with one another for communication and data access and download.



Source: Wikipedia

Star (server-based) System

Mesh System

Because the GeoHub is a caching proxy server (detailed further in the GeoHub section of this document), there is no centralization of data in the ERDAS TITAN Network. GeoHubs process requests, and index, stream and cache data, but do not host any data. Instead, data is hosted locally and the GeoHub acts as a relay mechanism, processing requests and streaming data between users. This inherently is an added security feature, as the GeoHub is able to manage the channels between users.

Also to note, ERDAS TITAN has no true download capability and instead advances the notion of streaming data as a service to clients through GeoHubs (detailed further in the Geospatial Web Services section of this document). ERDAS TITAN includes rapid creation of workgroups across networks and subsequent permission-based data sharing within those groups. Users may simply drag and drop data to the ERDAS TITAN Client and set permissions for various individuals and groups, publishing data privately within that network of users.

7. Data delivery mechanisms (Geospatial Web Services)

7.a. Is there a way to download data via the ERDAS TITAN application?

Neither the ERDAS TITAN Client nor the GeoHub support downloading entire datasets at this time.

7.b. Why has ERDAS TITAN implemented data delivery via geospatial web services?

There is no argument that having all the information you need at all times is the most ideal. However, what if, through web services, you are able to rapidly retrieve exactly what you need from any dataset, when you need it? The alternative, of course means waiting on traditional delivery methods (e.g. ftp, CD/DVD) and subsequently, bogging down your hard drive with gigabytes of data files. Timeliness and limitations of storage space are just two of the factors leading to the advancement and maturation of geospatial web services. The proposition of these services is considerable:

- Real-time, rapidly enabled, easily accessible, ownership-protected, web-based access to a vast array of specialized geospatial web services
- Web-based access to quality data, including raster, vector and terrain
- Services based on individual requirements (i.e. WMS for a quick jpeg map return; WCS for actual multi-dimensional data)
- Specialized web services enabling processes such as transformation of geographic coordinates, querying catalogs, editing vectors and more

Accessing and utilizing geographic information via the Internet continues to grow in sophistication, and it is important to note that this is a rapidly evolving space. Specifications for existing geospatial web services continue to be refined, and innovative new services will emerge to effectively analyze, process, transform and support complex transactions.

7.c. Can you detail the important implications and utility of geospatial web services?

- Real-time, interoperable data sharing
- Rapid and direct distribution of and access to online streamed data
- Ownership is protected while data sharing is optimized
- Provides a single point of access to a worldwide source of geospatial data (easy access to a global network of data, from a user's desktop)
- Relieves the requirement to locally amass gigabytes/terabytes/pedabytes of data
- Actual datasets remain in one place while being shared across vast networks of users
- Data quality is increased as users have immediate access to current data stores
- Data and services can be distributed at varying levels of complexity and function (e.g WMS, WCS, WFS-T and more)
- Improves the general flow of information across networks
- Propagation of data duplicates across various organizations may be eliminated as actual data lives in only one place
- Enables access to the thousands of geospatial directories and repositories across the world

8. What does it mean that I can 'retain digital ownership rights' with ERDAS TITAN?

ERDAS TITAN offers the ability for an organization to host its own data, without requiring the need to centralize the data or give up 'digital ownership rights.' Other companies provide solutions requiring your data to be hosted by them. In ERDAS TITAN, the data stays with the data owner.

9. Do I need to be Online to share and retrieve data?

Yes. You need to be online and signed into the ERDAS TITAN Network in order to participate in the ERDAS TITAN Network.

10. Does ERDAS TITAN utilize any Open Source projects?



Yes. Open Source Libraries employed by ERDAS TITAN are all listed as 'Credits' under the 'About' button in the ERDAS TITAN Client.

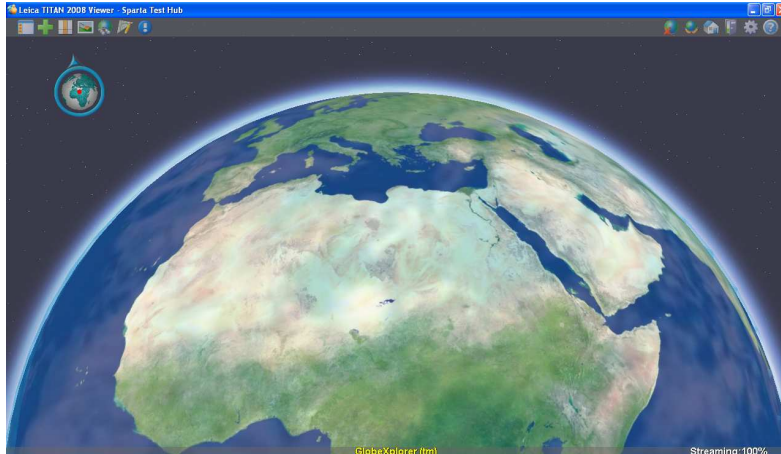
11. ERDAS TITAN Viewer

11.a. Where is all the default base imagery coming from?

All the base imagery that is seen in the ERDAS TITAN Viewer is coming from a GlobeExplorer® data store located in the Bay Area of California. GlobeExplorer, a DigitalGlobe company, is a leading geographic data integration and publishing company, providing online access to the world's largest commercial library of geographic information.

How it works: When you pan or zoom in the TITAN Viewer, a web request is sent to the GlobeExplorer data store. Image tiles located on those data servers are retrieved and served directly to the ERDAS TITAN Viewer. No GlobeX imagery travels through or caches on GeoHubs at all, but instead goes straight to the clients, and caches locally. Local caching relieves the user from continually having to reload the basemap data, a process that would slow things down considerably.

TITAN also supports the designation of alternative basemap and terrain sources. Basemaps may be designated using other users' shared data and services, or basemaps may be provided by the GeoHub or the Network itself. Alternative terrain sources are provided by Network



11.b. Where does the default terrain layer come from?

We utilize GTOPO30 dataset as a base terrain layer and stream it in just like the imagery layer. GTOPO30 is a global digital elevation model (DEM) resulting from a collaborative effort led by USGS EROS Data Center. Elevations in GTOPO30 are regularly spaced at 30-arc seconds (approximately 1 kilometer).

Currently the terrain model is being fed to the TITAN Viewer from a local web server. The terrain is tiled using a custom tool and pushed over to a web server.

11.c. Can I add local DEMs for terrain visualization?

Not currently, but this is in scope for 2009.

11.d. Should I use any WCS as a basemap in the TITAN Viewer

WCS can be *extremely* slow, since it aims to deliver an entire dataset. For this reason it does not serve well as a basemap for a globe.

11.e. What and how does data cache locally?

The ERDAS TITAN Viewer caches streamed data and web services, interacting with the data as fast as possible. For example, when zooming into an OGC WMS, ERDAS TITAN streams in image tiles (far less detailed than the original file) that were previously fetched and cached, to quickly render the desired view as best as possible. Furthermore, progressive updates are made in the display as more detailed tiles stream in.

Using the cache allows the persistence of the cached data through multiple viewer sessions. An example of this is the base imagery streamed from GlobeXplorer -- the user does not want to load this each time the Viewer is opened.

It is also important to note that attribute data summoned with the Identify tool does not cache locally. Attribute data *may* be cached on the GeoHub (server-side), which is an optional setting for a GeoHub.

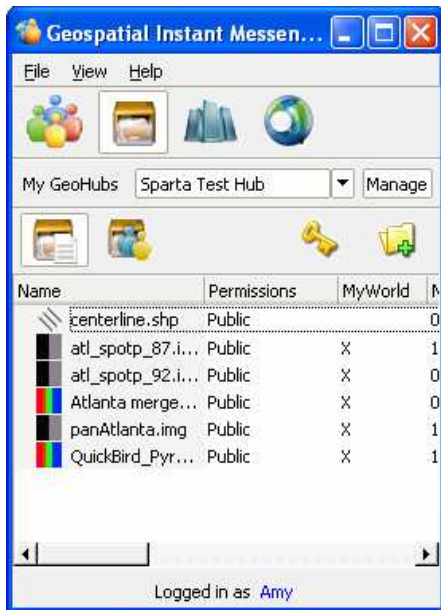
11.f. What is a MyWorld?

In the ERDAS TITAN Viewer, users create and share a MyWorld — a geographically enabled personal space — where they upload data, set permissions, and share content with other network users. With a MyWorld a user customizes and shares a ‘geospatial profile’ within the 3D virtual globe, and subsequently allows other users the ability to enter, navigate and explore with permission-based access. This space may include both geospatial data and interesting content like photos and ancillary information. After modifications, users can resave their MyWorld to preserve changes and also set permissions to any new data or content added to the MyWorld.

Elements of a MyWorld are specific to particular GeoHubs. Details for a user’s MyWorld (elements defining the MyWorld including geospatial data layers and location-based content) are stored in an xml file on each GeoHub.

11.g. Setting Permissions for data shared in a MyWorld

Permissions for data shared within a MyWorld are actually created and maintained through the Geospatial Instant Messenger. All datasets saved in your MyWorld will be added to your master list of shared datasets in the MyData tab in the GeoIM. Permissions for individual datasets may be modified within the GeoIM, and apply when users switch to your MyWorld.



11h. How do I Switch to see another user’s MyWorld?

By choosing another user via ‘Switch Worlds’ in the Viewer, the 3D globe rotates allowing you to see other users’ MyWorlds that they have shared. Similarly, other users do this to access your MyWorld, after you have shared it.

11.i. Clearing the Scene and Restoring your MyWorld

Removing data from the Viewer, either by clicking ‘Clear Scene’ or by manually adding or deleting data and content (like snapshots on the photo ribbon), will not affect a user’s MyWorld. A user can always restore their saved ‘MyWorld’ by clicking ‘Restore MyWorld.’ Consequently, the action of restoring a MyWorld will clear any other data or content that was not previously saved in the MyWorld.

11.j. What type of 3D models are supported in the TITAN Viewer?

TITAN supports KML/KMZ models. The KMZ models can contain DAE/Collada models as well. Most of the models you can download from Google's 3D Warehouse work fairly well. We will be improving our KML support with the August release

12. Data Formats, Georeferencing and Projection

12.a. How does ERDAS TITAN handle data coming from different sources and formats? (use of GDAL)

Data coming from different sources is generally handled through an open source spatial bridge library called GDAL/OGR (<http://www.gdal.org>). GDAL/OGR is responsible for abstracting the different formats to provide us with a single representation for reading data and coordinate system information from the data.



12.b. What raster and vector formats are supported in ERDAS TITAN?

TITAN supports a variety of raster and vector data formats and also KML and KMZ formats. Format support includes open source project GDAL/OGR for both raster and vector datasets, ERDAS IMAGINE raster libraries (when IMAGINE 9.3 is installed) and also custom implementations.

IMAGINE 9.3 support includes imagery with sensor models. A user must have ERDAS IMAGINE installed for this plugin to work. IMAGINE libraries support some of the same formats as GDAL. Connecting to IMAGINE libraries will override support by GDAL, meaning, if IMAGINE is installed then it will be used for all formats it recognizes with exception of ECW/ECWP. If IMAGINE is not there then TITAN falls back on GDAL.

TITAN utilizes Google's library 'libkml' to parse KML files and a custom code to process and render KML and KMZ. TITAN also utilizes a custom implementation for support of ECW and ECWP.

All data has to provide projection information or already be in the geographic projection.

Relevant links:

- <http://www.osgeo.org/>
- <http://gdal.org/>
- <http://gdal.org/ogr/>

Raster and Vector formats supported by GDAL/OGR:

These formats are supported to the extent of which the open source GDAL/OGR libraries are capable of loading. If you would like to add your own formats or require support for trouble with an existing format, please visit the Open Source Geospatial Foundation page for GDAL/OGR.

Local Raster Data

- First Generation USGS DOQ (.doq,.doq1) [old style]
- New Labelled USGS DOQ (.doq,doq2) [new style]
- Military Elevation Data(.dt1)
- ERMapper Compressed Wavelets(.ecw)

- Envisat Image Product (.n1)
- TIFF
- GeoTIFF
- ERDAS IMAGINE raster data (.img)
- JPEG JFIF
- JPEG2000 (.jp2,j2k)jp2ecw
- JPEG2000 (.jp2,j2k)jp2MrSID
- Multi-resolution Seamless Image Database (MrSID - 2000)
- National Imagery Transmission Format (NITF 2.1) [note: support for NITF in GDAL is limited]
- USGS SDTS DEM(*CATD.DDF)
- USGS Optional ASCII DEM (and CDED)

Unreferenced File Types/Photo Ribbon Support

- Portable Network Graphics (.png)
- MS Windows Device Independent Bitmap (.bmp)
- Graphics Interchange Format (.gif)

Local Vector Data

- ESRI shapefile
- MapInfo File
- TIGER

Raster formats supported by IMAGINE 9.3 (when installed):

Local Raster Data

- SPOT DIMAP
- DTED
- ERDAS 7.5 LAN
- ERDAS 7.5 GIS
- ENVI
- ER Mapper
- TIFF
- GeoTIFF
- IMG
- JPG
- MrSID
- NITF 2.0/2.1 (classified data)

Requires Defense Productivity Bundle

- TFRD (.tfrd) (classified data)

Supported Geospatial Web Services

- Web Map Service (WMS)
 - image/bmp
 - image/gif
 - image/ppm
 - image/ico

- image/iff
- image/ras
- image/rgb
- image/xpm
- image/jpeg
- image/png
- Web Coverage Service (WCS)
- ECWP image streaming protocol
 - can be transformed into WMS
- ERDAS APOLLO Image Manager (EAIM) Catalog

12.c. Does data shared on ERDAS TITAN need to be in WGS84?

No, but all data shared is reprojected to WGS84 if the input is georeferenced and has a coordinate system that is recognized. If the input is not georeferenced, then the file pixel coordinates are used (i.e. 0,0 to 256,256).

12.d. Where does the reproject come in?

While GDAL/OGR does not do the reprojection for us, we make use of the proj.4 projection library which is a part of GDAL/OGR distribution to convert all images and vectors into the same coordinate system (in our case WGS84). The only way this can happen is if we are capable of reading the coordinate system from the images/vectors using the GDAL/OGR libraries. The reprojection is done on the fly, occurring upon request. Imagery is really huge, so to convert a 10GB file on import would take a long time. The catalog process could take extended periods of time there were many large files to convert.

Most GIS file formats have their own way of supplying a coordinate system with their data. So long as GDAL/OGR can read the coordinate system from that file, and the file has valid extents, it will be reprojected to LL. If a file doesn't have a coordinate system, you can either use your proprietary tools to create one or manually assign one.

12.e. How is Unreferenced Data displayed in ERDAS TITAN?

Unreferenced data will display as a 2D overlay in ERDAS TITAN.

12.f. Is there CAD support in ERDAS TITAN?

Not at this time. GDAL can support DWG and DXF but only with OpenDWG support. Since we have not yet provided the OpenDWG format with GDAL in ERDAS TITAN, we cannot support CAD formats at this time. OpenDWG requires special permission to use.

12.i. MrSID files

Any MrSID image that has a coordinate system (CS) in it will work. These are "2nd generation" SID files. However, not all 2nd generation SID files have a CS.

SID files with ERDAS IMAGINE® based aux files associated with them will also work. This is a non-standard way to store a CS inside MrSID images however, ERDAS TITAN supports this by reading the aux files through GDAL. For a SID file with no CS, the quickest fix is to assign one in ERDAS IMAGINE, which will then create an aux file for it.

12.k. Data with World Files

TITAN only supports world files that are in geographic coordinates latitude/longitude (LL). World files provide extent information, but don't contain any embedded information within regarding the coordinate system or projection

information. World files relay a position in space describing the location, scale and rotation of the map, but since TITAN doesn't know what the coordinate system is it can't project the data onto a globe. TITAN always check the extents first to see if the image can be overlaid on the globe, but to work the image file itself must also contain coordinate system information.

The TITAN team is working on a solution to read data with world files and aux files in the future.

13. Data Sharing, Loading, & Access

13.a. How do I share local data publicly in the ERDAS TITAN Network?

You can share up to 10GB (actual file size) or 10 files free with the ERDAS TITAN Client. Data shared in the ERDAS TITAN Network, and not within another organization's GeoHub, is open and accessible to everyone on the ERDAS TITAN Network.

Private data sharing by individuals is not enabled via the open ERDAS TITAN Network. For private data sharing, an individual must participate with the GeoHub of an organization participating in the ERDAS TITAN Network.

13.b. Can I limit who accesses my data (i.e. share data Privately)?



Yes, but only through a GeoHub. In the permission-based data distribution system enabled by a GeoHub, an individual is a 'Subscriber' and may be empowered to share data privately to individuals and groups within that GeoHub. When the user adds data to the GeoIM, the user may subsequently assign permissions to that data. GeoHub permissions are further described in the 'GeoHub' section of this document.

13.c. What is MyNetwork?

A GeoHub Admin may enable you to share data privately on a particular GeoHub. Besides enabling you to share data privately to individuals, the GeoHub Admin may also add you to particular workgroups with whom you may jointly share data. Besides this, you also have the ability to create your own personal group of people to share data to, on each GeoHub. This is called 'MyNetwork.' You add people to MyNetwork simply by right-clicking on their name and choosing 'Add to MyNetwork.' You can click 'Show only users in MyNetwork' on each GeoHub to see who belongs to your MyNetwork on that GeoHub. The utility is in your ability to share data privately to all the people in this group, by giving access only once to the entire group 'MyNetwork' within the Permissions dialog box.

13.d. Where do my actual datasets go when I share them?

Your datasets stay with you, locally on your computer. The ERDAS TITAN Network is not a hosted data solution, so data in a user's MyWorld and any geospatial datasets and location-based content exist on the user's local machine and do not reside on any ERDAS servers. When data is 'shared', it is indexed on the particular GeoHub (proxy) the user is logged into. Only data that is requested by other users is paged to the other users.

*Note1: Caching of the streamed portion of data does occur. The portrayal of geographic information as a digital image file that is streamed through a GeoHub to another user does cache, both at the GeoHub and also locally on the other user's machine. The concepts of caching both locally and on the GeoHub are described in more detail throughout this document.

*Note2: Some user-specific information is stored on a GeoHub. This is detailed in the 'GeoHub' section of this document.

13.e. If I access my own shared local data, does the data go to a GeoHub and back again?

If you look at your data locally, it does not go back to the server. There is no traffic for standard viewing of local data.

13.f. When you remove a dataset you are sharing and add it back, does TITAN recognize it as the same file?

Yes. TITAN recognizes the file based on its full path name, so it will recognize a previously loaded file based on its associated path. Assuming the files that are reloaded are subsequently reset with original permissions, then everyone with prior access will have access again. Behind the scenes, however, the data will get pulled down as if it was new. The file will be completely re-cached on the GeoHub and also locally for each user.

13.g. What happens if I access my own shared local data...does that invoke network usage?

Accessing a local dataset will not generate any network traffic.

13.h. What Style Setting functionality is there, in both the GeoIM and the TITAN Viewer?

In the GeoIM and also in the TITAN Viewer, you can adjust raster and vector viewing properties via right mouse menu option Set Styles. The Styles you set in the GeoIM are maintained when others consume your data across the ERDAS TITAN Network. Setting styles for vectors includes extruding by height attribute and using labels along with setting colors, width and size. Setting styles for rasters includes setting the background to transparent, selecting a color for the background, and choosing 'No Stretch' to toggle off the 2 standard deviation stretch applied to all raster imagery (now a general Preference setting).

GeoIM Set Styles support varies across different applications.

1. Google Earth: Full support.
2. TITAN Viewer: Full support.
3. Copy WMS URL: Full support.
4. Microsoft Virtual Earth: Vectors become rasters in MVE. The rasters overlay using the other styles correctly in VE, but MVE ignores the extrude and label options, as TITAN doesn't currently support rasterizing labels. Also, there is no way easy way to show extruded polygons in a rasterized environment.

13.i. How does compressed data count against my volume sharing limitation?

The GeoIM counts the volume of a compressed file at its *uncompressed* state. Essentially TITAN does a quick calculation of width and height of raw pixel data for a file, and multiplies that by the amount of bands in that image. This means that the uncompressed volume is what counts against a user's volume sharing limitations.

For example:

- User has 1GB volume sharing limit
- User has 10GB sid file compressed to 500MB
- User *will* be able to drag and drop file into GeoIM with No Permissions
- User *will NOT* be able to publish file to others

13.j. How are KML files shared?

When you share any of the KML files located on your system, a reference to the file(s) is made, and the GeoHub is notified that you are sharing it (just like a raster for instance).

Assuming the requesting user has permission to see the KML file you are sharing, when a user requests the KML from you, TITAN does the following:

- Encrypts and sends the KML to the GeoHub
- The GeoHub caches the KML file
- The KML file is sent to whoever requested it
- A local version of the KML file is then created on the requesting user's machine
- The user decrypts it if they have the proper access key (permission)

13.k. Loading data into various applications.

- Copy URL:** WMS Server capability is embedded in the ERDAS TITAN Client and running on your local machine. It translates requests from WMS to the TITAN protocol seamlessly. Note, this means you must have the TITAN Client running on your machine to use this service. In order to access a WMS, a user will simply copy the URL (either with 'Copy All URL' or 'Copy Selected URL') associated with the data and paste to the WMS compliant application. When consuming data from via WMS, data travels through the GeoHub and caches there, as well as caches locally.
- Google Earth:** Geospatial data published to the ERDAS TITAN Network using the Geospatial Instant Messenger may be consumed in Google Earth. The user simply shares the data and ERDAS TITAN does all of the work. When a request is made, a KML is created on the machine sharing the data. More specifically, super overlays are created for rasters and regionated KML's are created for vectors. The KML is then passed through a GeoHub, which subsequently serves it to the requesting user. The requested region is calculated on the fly and cached for future use. Data in this process is cached both locally and on the GeoHub through which the data traveled. The KML format supports attributes, but in converting datasets to KML, TITAN does not push attributes through. There is potential for only one attribute to be pushed through in KML conversion and that is the attribute chosen for Labels in Set Styles, and Labels must be turned on.
- Microsoft Virtual Earth 2D and 3D:** Geospatial data published to the ERDAS TITAN Network using the Geospatial Instant Messenger can be consumed in Microsoft Virtual Earth 2D and 3D. The user simply shares the data and ERDAS TITAN does all of the work. When a request is made for shared data, ERDAS TITAN facilitates that data to be streamed into either Microsoft Virtual Earth 2D or 3D. Virtual Earth uses encoded tile URL requests. Data in this process is cached both locally and on the GeoHub through which the data traveled.
- ERDAS TITAN Viewer:** Any data shared through the Geospatial Instant Messenger may be viewed in the ERDAS TITAN Viewer. Data in this process is cached both locally and on the GeoHub through which the data traveled. Raster geospatial data is streamed into the TITAN Viewer utilizing a custom protocol. Vector files are converted to KML. The KML format supports attributes, but in converting datasets to KML, TITAN does not push attributes through. There is potential for only one attribute to be pushed through in KML conversion and that is the attribute chosen for Labels in Set Styles, and Labels must be turned on.

13.l. In loading data from ERDAS TITAN to Google Earth, does GE only support the Geographic Lat/Long format or all other formats?

Google Earth only works in Geographic Lat/Lon. ERDAS TITAN will attempt to reproject all imagery/vectors into a WGS84 coordinate system. In order to do so, the image/vector must have a coordinate system defined for it.

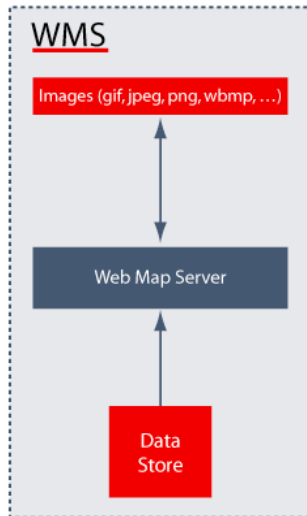
- Now the user can use that KML for any purpose, just as if we had simply copied it from our machine onto theirs

14. Web Services (Streaming, Publishing, Translation & Consumption)

14.a. What is an OGC WMS, WCS, WFS and CS-W?

An OGC Web Map Service (WMS) produces maps of spatially referenced data dynamically from geographic information. This international standard defines a "map" to be a portrayal of geographic information as a digital image file suitable for display on a computer screen. A map is not the data itself. WMS-produced maps are generally rendered in a pictorial format such as PNG, GIF or JPEG. This contrasts to a Web Feature Service (WFS), which

returns actual vector data, and a Web Coverage Service (WCS), which returns actual multi-dimensional data. (Source: Wikipedia). A portrayed WMS can also be built on top of other Web Services sources like WFS and WCS. A Catalog Service for Web (OGC CS-W) specification supports the registry and discovery of collections of descriptive information (metadata) for data, services, and related information objects. CS-W plays a directory role in the open, distributed Web service environment. Data and services providers register their capabilities using metadata, and users can then query the metadata to discover information. (Source: Web Services Implementation at GeoBrain, LAITS)



(Source: IONIC RedSpider Concepts Guide)

WMS Architecture

14.b. What is ECWP?

ECWP (Enhanced Compression Wavelet Protocol) is a very powerful streaming imagery delivery protocol, providing significant performance enhancements over other protocols sending compressed image data to the client. The client then decompresses this image data. ECWP supports local caching of data and real-time pan and zoom. ECWP provides a quick response, significantly reducing network traffic and server loads. To enable ECWP in ERDAS TITAN, install the ActiveX plug-in from here: <http://demo.ermapper.com/sampleiws/SimpleExampleNative.htm>.

14.c. What is the ERDAS APOLLO Image Manager Catalog?

The ERDAS APOLLO Image Manager (EAIM) supports the registry and discovery of collections of descriptive information (metadata) for data layers in a data management system. ERDAS TITAN supports browsing, discovery and utility of these geospatial information resources from the EAIM. The Geospatial Instant Messenger consumes a layers discovered from the EAIM that has indexed the geospatial data for an organization or network.

14.d. WMS Publishing

When geospatial data is published using the Geospatial Instant Messenger, the software automatically publishes a WMS (Web Mapping Service). This web service allows users to directly access this data over the Internet without physically placing the entire dataset on a local machine. Once your data is published, a user who has an OGC WMS compliant desktop application will be able to access that data through the web service. To access a WMS, the user simply copies the URL via a simple menu selection, and then pastes the link to the WMS compliant application.

14.e. Web Service Consumption and MyServices



The Geospatial Instant Messenger currently supports consumption of OGC compliant WMS and WCS, ECWP. Through MyServices in the GeoIM, users are enabled to populate a list of web services, access respective service layers and load those layers into client apps. Using a general import dialog box to add services, a user can amass a collection of public and private web services which are also accessible by others on the ERDAS TITAN Network. The configured services are displayed in the service tree, which can be browsed like the tree in a file explorer. Services are grouped according to type, including WMS, WCS and ECWP.

When consumed, WCS/ECWP files simply get transformed into a WMS layer. TITAN can make any random LL request and the pixel data will be fulfilled in the request. This is how the WMS connector works.

14.f. Does MyServices list change when I switch GeoHubs?

No. A user's list of web services will not change when a user switches GeoHubs. There is one list per user, stored on the ERDAS TITAN Master Server. What is stored exactly is a small xml file that is downloaded for each request (essentially part of the user's profile information). This way, a user doesn't have to add their web service url's every time they log into a different GeoHub. Since these web services are publicly available, users are not enabled to set permissions on them.

14.g. Web Service Caching

In consuming web services the client will request blocks straight from the source, so it will only cache locally and not cache at or pass through a GeoHub.

14.h. What protocol does ERDAS TITAN use for Data Streaming (http)?

ERDAS TITAN strictly utilizes http, supporting both standard http or https the GeoHub. The Master Server will always use https. This transition to http relieved the issues during beta with ports, and makes TITAN traffic standard http traffic. In addition ERDAS TITAN will no longer need to rely on a constant connection.

14.i. What protocol does TITAN use to stream data?

TITAN uses a web server to stream the terrain. In general the data that is shared between users is shipped across using a proprietary protocol.

14.j. Web Service Translation (for example: ECWP->WMS)

Question:

"Could I have Image Web Server create an ECWP, have TITAN ingest the ECWP and then have TITAN create a WMS that could be ingested into ArcMap?...Kind of a way to get between barriers of different applications. In other words, TITAN would be a proxy."

This is correct. In general, TITAN empowers 3rd party applications to ingest any data that TITAN supports. For example, uDig doesn't read IMAGINE (.img) files, and Google Earth default is KML...In TITAN, many different file formats are transformed through a translation layer and can be subsequently loaded into a variety of applications like UDig, Google Earth, ArcMap, GeoMedia, AutoCad...the list goes on.

The TITAN Client currently consumes WMS, WCS and ECWP. If you want to, say, load a WCS or ECWP into ArcMap: TITAN will transform the WCS or ECWP data into a WMS layer. TITAN can make any random LL request and the pixel data will be fulfilled in the request. This is how the WMS connector works. Other proxy actions:

- WMS, WCS and ECWP consumed by TITAN can be loaded natively into the TITAN Viewer, with no translation
- Loading a WMS layer through TITAN into a WMS compliant application: no translation is applied. It directly accesses the service using the existing URL.
- Loading a WMS, WCS and ECWP layer through TITAN into an application that takes a particular format (i.e. Google Earth consuming KML): TITAN transforms that layer into a KML and then loads it into Google Earth

14.k. Why am I having trouble consuming some web services, such as WMS and WCS?

There are a lot of web services available out there that are not strictly conforming to standards. Also to note, some services are not as reliable as others. We released OGC compliant WMS and WCS consumption capability with the understanding that a series of enhancements are required, on our part, to accommodate a great degree of variation that exists for currently available web services. As consuming web services becomes more common, you'll see organizations conforming more to standards. Until then, however, we are adjusting our consumption of web services through ongoing efforts.

14.l. Is streaming data through ECWP still slow?

Not anymore. Before August 2008, we used GDAL to support ECW data, but GDAL only had one pipe open to ECW files. This was fine for local ECW files but it seriously impacted the performance of streaming data through the ECWP protocol. We now have implemented our own plugin for streaming ECWP, based on the ER Mapper SDK, and make optimal use of the protocol. The new implementation opens up multiple pipes to now stream the imagery down asynchronously. So instead of making only one file request at a time we make multiple requests at one time, and performance gains are very high.

14.m. Other available free applications seem to be further ahead (at this time) in consuming and viewing various web services. What differentiates ERDAS TITAN from these applications?

ERDAS TITAN is a much broader application involving consumption of data into variety of other client applications, social networking, proxy-based data sharing, etc. Some points about ERDAS TITAN that are helpful comparisons:

- ERDAS TITAN is very focused on the ability to load raster and vector data from disk, which is the biggest difference you will find in our client compared to others.
- ERDAS TITAN is able to render large amounts of geometry/vector data natively. If you test dropping data into any other client, even if they can support it, it will likely bring them to a crawl (comparatively).
- ERDAS TITAN is able to support the streaming of imagery from other users.
- ERDAS TITAN allows users to composite their world, save a snapshot of it and instantly transfer that copy to someone else's desktop. None of the other viewers can do this.

To note, IONIC, now a part of ERDAS, have led the OGC in standardizing web services. They have already done a lot of work and built a client that can accommodate a variety of web services. This client currently has too large of a footprint to sew onto ERDAS TITAN. However, we are working to streamline their client to integrate it with ERDAS TITAN, which will greatly affect the variety of web servers that we can accommodate. In the future, you will see a broader accommodation of web services.

14.n. What WMS formats can TITAN consume

TITAN may pull the following formats from a WMS. The following MIME types are now supported:

image/bmp
image/gif
image/ppm
image/ico
image/iff
image/ras
image/rgb
image/xpm
image/jpg
image/jpeg
image/png

14.o. With a TITAN created WMS URL, can I change the IP from the local host to my Local Area Connection IP?

The WMS URL from TITAN will look something like this:

<http://127.0.0.1:8090/wms.cgi&user=Amy&image=C:/Demo/rectified%20imagery/Lanier/lanier.img?Service=WMS&Version=1.1.1&Request=GetCapabilities&hubid=5051&>

All of the URLs used within TITAN reference the localhost, which is 127.0.0.1. The question is could a different IP on the machine be substituted in for the 127.0.0.1. The answer is no, if you change the local host IP the URL will no longer work.

14.p. Can I use my TITAN created WMS URL on another machine than the one it was created on?

No. TITAN URLs can only be used on the machine they are created on, and TITAN Client must be running for them to work. TITAN URLs cannot be modified nor used on other machines.

14.q. What are the file dimensions for maximum image request

TITAN currently caps the size of a WMS image generated from a published local dataset to 256x256 for data consumed from others and 512x512 for local reads. This means that for your own local data you get 512x512 resampling. If someone else is remotely viewing your data, they get it at 256x256. If you're viewing someone else's data, you get it at 256x256. There is no way to override the settings currently but a future release will enable the GeoHub Admin to control this limitation.

We do this in TITAN because the png data that travels through the system gets pretty big if the size is not capped. For TITAN we chose png encoding because we have to uphold transparency values. It's a self imposed limitation so that we don't kill the system with (for example) 1600x1200 png encoded data requests every time the user pans in any viewer. By limiting the max request dimensions we're not sending huge chunks of data through the system for every WMS request.

If the data looks stretched and coarse in your viewer, the data is likely getting stretched to fit a higher resolution for that viewer. In other words, the viewer resolution is too high. A user can simply shrink the size of the viewer screen, and the resolution will appear less stretched and more fine. A good rule of thumb is that anyone viewing the WMS should try not to go over twice the capped screen size (256x256 is the limit)

15. Communication

15.a. Can I limit who can chat with me?

Yes. In the Geospatial Instant Messenger you can individually 'Block Chat' to prevent users from chatting with you via the IM capability.

15.b. Do we use HTTP for communication?

ERDAS TITAN 2008 utilizes http for all communication and data streaming. By definition, http is not persistent, so there will be many http connections established over the course of using the application, much like using a web browser.

15.c. Can you see other users that are logged onto different GeoHubs than you are?

No. In your user list you will only see the user names of people connected to the same GeoHub that you are currently on. When you switch GeoHubs, the user list will change to reflect users on that particular GeoHub.

16. GeoHub

16.a. A GeoHub, technically speaking, is a Caching Proxy Server

In the ERDAS TITAN Network, all communication, data indexing, access and streaming is conducted through GeoHubs. A GeoHub is a caching proxy server. The GeoHub can service requests without contacting the specified server, by retrieving content saved from previous requests, made by the same client or even other clients. This is called caching. Caching proxies keep local copies of frequently requested resources, allowing large organizations and Internet Service Providers to significantly reduce their upstream bandwidth usage and cost, while significantly increasing performance.' (source: Wikipedia). Caching request for particular datasets is useful because requests are repetitive and are made in a uniform manor - i.e. all users make the same type of requests. The WMS engine which is used in the TITAN Client will symbolize the data using a local set of style information. Therefore, every TITAN Client's request will be the same with respect to symbology.

A GeoHub maintains master index records on geospatial data that is shared within that particular GeoHub community, as well as all registration and subscription records for users that participate within that GeoHub community. To note, each particular GeoHub maintains information only on data shared and users participating within that specific GeoHub.

The GeoHub for-sale product is the same proxy server technology that exists at the hub of the ERDAS TITAN Network. The for-sale GeoHub is a proxy server extended to include an Administration capability for setting policies, authenticating users, managing security, creating groups, etc. ERDAS does not impose volume limitations on data sharing for these GeoHubs. Rather, GeoHub Admins are responsible for setting volume and file size limits for each unique Subscriber to an organization's GeoHub, as well as other permissions.

Data streamed (consumed) through GeoHubs will cache on that particular GeoHub. *It is important to mention: For individuals sharing 10GB and 10 files for free on the open ERDAS TITAN Network, the data they share will cache on ERDAS' GeoHub. Data shared by individuals participating on other organization's GeoHubs will cache on those GeoHubs.

16.b. What user-specific info actually gets stored at a GeoHub?

- Subscription/user profile/group information for each user is stored in the SQL database
- List of who is permitted to view each file is stored in the SQL database
- User's list of shared files is stored in an xml file
- User's MyWorld details (elements defining the MyWorld) are stored in an xml file.
- Data is cached on the hub as it is streamed to other users (it is stored encrypted)

16.c. Can I share data privately via my subscription to a GeoHub? What are the other limitations?

Private data sharing, meaning the ability for clients to publish data and give permission-based access (restricted) to individuals and groups within that GeoHub, is enabled through for-sale GeoHubs employed by organizations participating on the ERDAS TITAN Network (but not enabled by the public ERDAS TITAN Network itself). A GeoHub Admin has complete control over individual subscriber limitations, including if a subscriber can share publicly, privately, or not at all (consume only). The Admin also imposes limitations on the total volume and total number of files a user can share.

16.d. How do I get a subscription to a GeoHub?

A GeoHub may be set to auto-generate subscriptions, or else an Admin will manually generate a subscription for a user. A user requests a subscription to a GeoHub using the Geospatial Instant Messenger. A user also uses the GeoIM to log into different GeoHubs.

16.e. Can I be logged onto more than one GeoHub at a time?

No. In the ERDAS TITAN Network, you are only ever logged into one GeoHub at a time. When you are logged into a GeoHub with your subscription, you are only participating with individuals that also have a subscription to that GeoHub. The users that you communicate with and share data with are all members (subscribers) to that particular GeoHub community.

But when you perform searches, you search across all GeoHubs participating in the ERDAS TITAN Network, and may retrieve data from different GeoHubs than the one you are logged into.

16.f. Can I be online on the ERDAS TITAN Network and not be logged into any GeoHubs?

No. Current configuration requires that you must be logged into a GeoHub at any time to be online on the ERDAS TITAN Network. If the GeoHub you're logged into goes offline, you will be signed out completely from the Network and will be presented with different options (see next).

16.g. What happens if the GeoHub I'm currently logged into goes offline?

If the current GeoHub a user is logged into goes offline, the user will consequently be signed out of the ERDAS TITAN Network and presented with the Login box. The user will be presented with different options

1. User is connected to City of Acme GeoHub
2. City of Acme GeoHub goes down
3. User is consequently signed out of the ERDAS TITAN Network
4. User is returned the Login box which contains the following information:
 - a. Server generated message stating that the City of Acme GeoHub is now offline
 - b. Reconnect timer (which will be counting down till attempt to reconnect)
5. User has two options:
 - a. User may do nothing:
 - i. If user has 'Automatically sign in at TITAN Launch' selected for every Login (Note: see Preferences section of this document), ERDAS TITAN will continue to try to reconnect: after 5 minutes initially; if unsuccessful, it will continue trying to reconnect every 60 seconds
 - ii. If user does not have 'Automatically sign in at TITAN Launch' selected for every Login, ERDAS TITAN will not try to reconnect and nothing will happen
 - b. User can click 'Sign In' at any time:
 - i. If that particular GeoHub is available again, it will log him in
 - ii. If that particular GeoHub is still not available, the user will be returned a list of all available GeoHubs to choose from log into

16.h. What is the Permission Structure affecting the ability of an individual user to access data within a GeoHub?

- **User:** An individual ERDAS TITAN user account. A user can have subscriptions to zero or more GeoHubs. A user can belong to zero or more groups on a particular GeoHub.
- **Subscriber:** A permission enabling a ERDAS TITAN user to connect to a particular GeoHub. A GeoHub administrator can set permissions on each subscriber such as whether they are allowed to share data publicly or privately, and the amount of data they are able to share. When a user shares a dataset, they can restrict access to one or more specific subscribers.
- **Group:** A collection of subscribers to a particular GeoHub. A group is created and managed by the administrator of a GeoHub. When a user shares a dataset, they can restrict access to one or more specific groups.

16.i. What are Permissions set by GeoHub Admins for individual Subscribers?

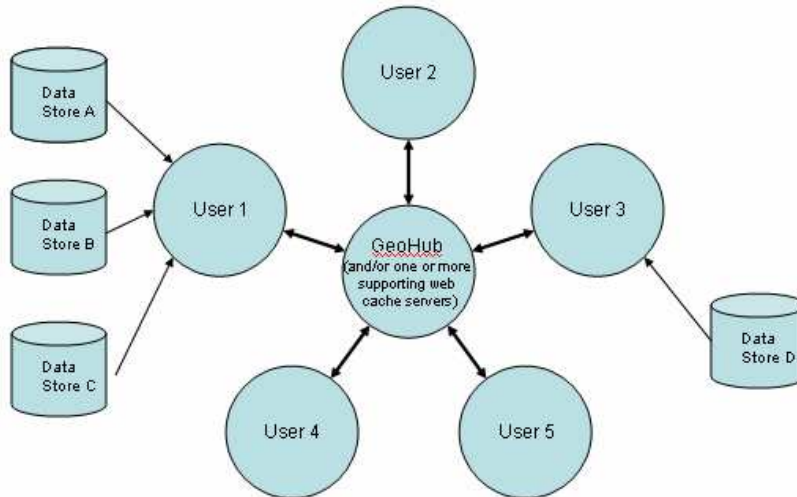
- Can share data publicly? Y/N
- Can share data privately? Y/N
 - Note: you may not be able to share anything, only consume; this will typically be the case for Autopen Subscriptions
- Sets Volume Limits for how much you can share
 - Maximum number of datasets shared
 - Maximum size of datasets shared
- Sets your ability to share data publicly; *Likely only a few trusted people within a GeoHub will be allowed to share data 'publicly', meaning, share data so that it is searchable by all on the ERDAS TITAN Network
- If you have not been given permission to share data publicly, you cannot choose to do so.
- Through your subscription, the Admin may have assigned you to Groups of other subscribers, with whom you also may share data
- When you share data via drag and drop, you are immediately presented with a list of individuals and groups whom you can select to share the data to (this is based on permissions set for you by the Admin)

16.j. What are Permissions for individual Datasets?

- Permission List for Datasets:
 - Users that have access to this dataset
 - Groups that have access to this dataset
- *Data is always 'private' unless it's public!
- In sharing data privately, you are either sharing to individuals, groups, or to an entire GeoHub maybe (which is another Group)
- In sharing data publicly, you are sharing it with the entire ERDAS TITAN Network. That data can be searched upon and accessed by the entire public network.

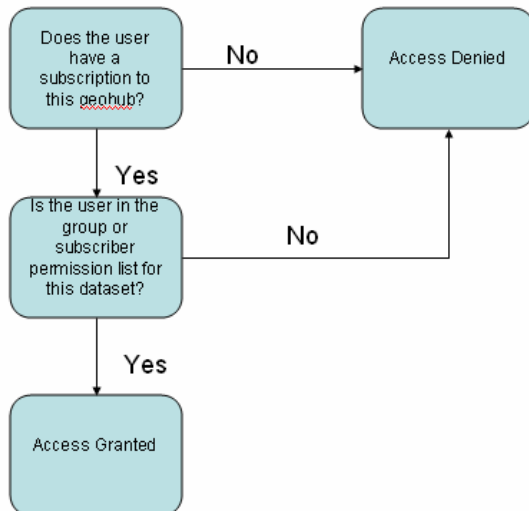
16.k. What does GeoHub Dataflow look like?

TITAN GeoHub Dataflow



16.I. Flowchart for User Accessing a Dataset

Flow Chart for a User Accessing a Dataset



16.m. MyWorlds are unique to each GeoHub

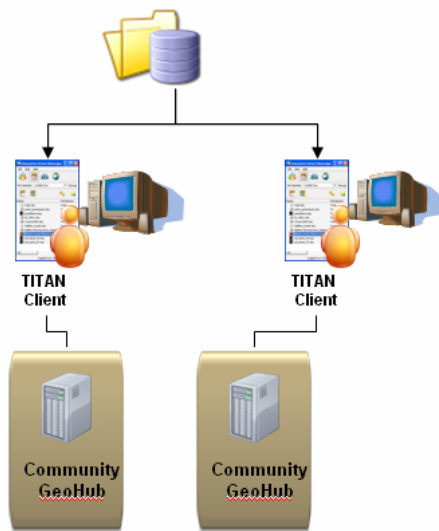
Yes. Each user creates and shares one unique MyWorld per each separate GeoHub. Elements defining these My World's will be stored on that GeoHub via a small xml file. The xml file basically stores a list of layers in the world along with the other miscellaneous info (eye point, screenshots, etc).

16.n. MyWorld Permissions

As described previously, a user creates one unique MyWorld particular to each GeoHub. Within that GeoHub, the same rules apply to sharing a MyWorld that apply to sharing data via the Geospatial Instant Messenger (these permissions are described above in this same section). When a user creates and shares one unique MyWorld in a GeoHub, only users within that GeoHub can switch to that MyWorld, and furthermore those users will only see those data layers that they have permission to see.

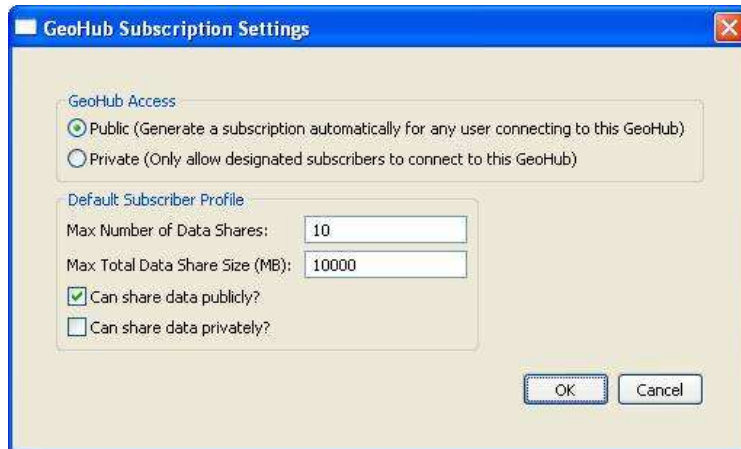
16.o. How is one data store shared to two separate GeoHub communities, simultaneously?

Currently, only one ERDAS TITAN Client may be running on a machine at any given time, and any user may only be logged into one GeoHub at a time. ERDAS TITAN Clients are used to share data to a GeoHub community. Currently, to make one data store simultaneously accessible to two GeoHubs at one time, two separate machines, each running one ERDAS TITAN Client, need to be stood up. One Client on one machine is logged into one GeoHub, and the other Client on the other machine is logged into the other GeoHub. Clients on both machines publish data from the same data store to the separate GeoHubs, simultaneously.



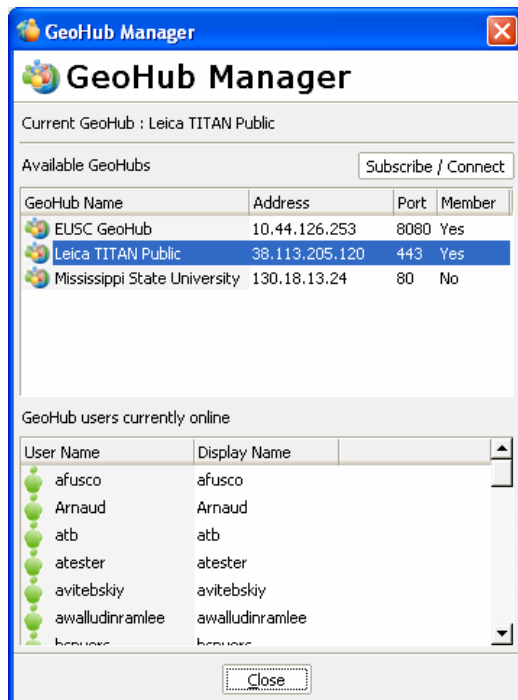
16.p. What does it mean to set a GeoHub to ‘Public’ or ‘Private’?

You can set a GeoHub to ‘Public’ and it will generate subscriptions automatically for anyone who requests one. You can set a GeoHub to ‘Private’ and only designated subscribers will be able to subscribe and connect. See below, this a snapshot from Settings in the GeoHub Admin Tool.



16.q. Can I completely hide that my GeoHub exists on the TITAN Network?

On the TITAN Network, you cannot 'hide' that your GeoHub exists, but you can make your GeoHub 'Private' and only let designated subscribers connect. The only thing others on the TITAN Network will be able to see about your GeoHub is that it exists. In the GeoIM, a user can click the 'Manage' button and see a list of all GeoHubs that participate on the TITAN Network. A user can select any GeoHub and click the 'Subscribe/Connect' button. If the GeoHub is set to 'Public', that user will automatically be subscribed and connected to that GeoHub. If the GeoHub is set to 'Private', the user will be prompted to supply a Subscriber ID in a dialog box. They would have received this Subscriber ID from the GeoHub Admin.



16.r. Should we host a GeoHub in-house or at a dedicated hosting facility?

Simply put, setting up a GeoHub in-house may be more affordable in the long run, but a dedicated hosting facility has 24/7 support in case you have any system issues. That's a lot of what you're paying for.

16.s. Can I run two GeoHubs on the same server?

You can run more than one geohub on the same server by running another instance of tomcat. You just have to make sure they don't have any conflicting ports.

16.t. Can GeoHubs publish data to other GeoHubs?

Technically, a 'GeoHub doesn't make data available to other GeoHubs.' In the TITAN Network, individual TITAN Clients are used to publish data, and those same TITAN Clients are used to consume data. A GeoHub enables an organization to use TITAN Client(s) to publish data that can be accessed by other TITAN Clients in the TITAN Network. The availability of the data to users is based on if the data is published publicly (accessible by all) or privately (to individual users and/or groups). If organization A has a GeoHub and wants to make data available to organization B: organization A can acquire *individual* email addresses from organization B and use the GeoHub Admin Tool to create a group of subscriptions based on those email addresses; creating the means for data to be published privately to those individuals. TITAN Clients would be used to actually publish data privately to that group of users. That same group of users would also use TITAN Clients to access the data.

16.u. What types of data cache on the GeoHub?

Local geospatial data delivered through the GeoHub and to other TITAN Clients may or may not cache, depending on the type of data that traverses the GeoHub. Translated KML data, including raster and vector geospatial data that is converted to KML, will cache at the GeoHub. Raster and vector data converted to WMS or into tiled URL requests for Microsoft Virtual Earth will not cache. No external web services consumed via TITAN Clients (WMS, WCS and ECWP) cache at the GeoHub currently. Also, file-based KML or KMZ does not currently cache.

17. Security



17.a. Security Model Overview

ERDAS TITAN is designed to provide a mechanism for sharing geospatial content and allowing providers of data to create restrictions on who can view and utilize their published data.

The security model is maintained throughout the TITAN application by a combination of settings on both the ERDAS TITAN Master Server and also ERDAS TITAN GeoHubs that participate on the TITAN Network.

The TITAN Client implements a user on the TITAN Network. The Client is capable of storing references of datasets on the server which can be referenced by external users. A user has the ability to assign permissions to every published dataset and enable access for individuals, workgroups or public access.

To avoid redundancy, or accidentally sharing files, the full path to the files are used when referencing files. By not relying on tags, TITAN can guarantee that once you change the permission on that file, it will get reflected for all instances of that file. This means a file can be added to a folder in MyData and will retain its individual identity and maintain user permissions.

Datasets published with permissions every single dataset has to have a corresponding list of users/groups who have permission to view that dataset. On the client side, this list is maintained by the desktop UI. To keep the server in synch, every time you log in, your updated list of published datasets and permissions are set on the server. This way your client list and server list will always be in synch.

Currently, there are only two permission states. This means that a user can or can't read a dataset. No editing permission has been added at this time.

17.b. Definitions

- **User:** a single user on the TITAN Network, identified by a unique user ID and secured by a password
- **Subscription:** a pairing of a user and a specific GeoHub, identified by a Subscription ID that is unique on that GeoHub; subscriptions are used to control who can connect to a specific GeoHub
- **Group:** a collection of users on a specific GeoHub, identified by a GroupID that is unique to that GeoHub

17.c. Dataset Security

Each dataset shared on network TITAN can be configured in one of three ways:

- **Public:** the dataset is available for use by all users on the TITAN Network.
- **Restricted:** the dataset is only available to one or more users or groups on the TITAN network. The owner must specify the users and groups that are allowed to access the dataset.
- **Local:** the dataset is can only be viewed by the owner of the data. It is not shared with any users on the TITAN network.

17.d. Encryption

Encryption is employed by both the Master Server and optionally the GeoHub to safeguard internet communication. User passwords are also always stored in the database in an encrypted format. There is 128bit encryption employed for data on the client side. Whenever there is a change in permission, keys are randomly updated based on the clients machine and time of change. Key encryption is very advanced.

17.e. GeoHub Encryption Specifics

- SSL Encryption optional for all client network traffic
- No user passwords stored in the database
- Administrator password is stored using MD5 encryption

17.f. Master Server Encryption Specifics

- Requires SSL Encryption for all traffic
- User passwords are encrypted using MD5 hash in the database
- Administrator password is stored using MD5 encryption

17.g. Dataset Security

Every dataset has a list of users that have permission to see it. The first level of security is that if you don't have permission to view a dataset, you won't see it in your IM when viewing another user's files. This ensures that you can't make requests against those datasets.

17.h. Security from different perspectives

As described here, the user with the data essentially has full control over the data. The GeoHub is merely used as a means of checking permissions and caching data.

17.h.i. the data publisher's perspective

1. A request comes in from a user:
2. The client checks to see if the file requested is published to anyone (if permissions have been made)
3. If the file isn't shared, the request is denied and notification is sent back with no data
4. If the file is published with permissions, a unique key associated to that dataset is retrieved
5. The client request is then fulfilled [could be anything, from a raster read, vector read, attributes query]
6. The request is then encrypted using the unique key for that dataset
7. The request is then sent back to the GeoHub to be cached

17.h.ii. Security from the data requester's perspective

1. Before a TITAN Client loads any dataset it checks the GeoHub server to see if it has permission to view the dataset
2. If the client has permission, a key and a modification timestamp are retrieved
3. The client then makes requests to that GeoHub server for the data with the current timestamp
4. When/if the data is retrieved, the client now has to decrypt the data in order to view it
5. If the data is public, the key is blank and no decryption occurs
6. If the data is private, the key retrieved during the initial validation check is used to decrypt the block of data
7. A client will only get keys to datasets the user has permission to access. This is managed by the GeoHub.

17.h.iii. Security from the GeoHub perspective

1. The GeoHub knows which data a user can see
2. When a client does a permission check to see if the user can view a file, the GeoHub will return keys only for what was requested
3. When a request comes in for a particular block of data, the first thing that happens is the GeoHub cache is checked.
4. If the data is already in the cache, it's sent back to the user (remember the data is stored encrypted on the GeoHub)
5. If the data is not yet cached, the request is sent to the user with the data; the data is returned to the GeoHub, cached when it gets back and also then sent back to the user

17.i. Caching

A question we get all the time, is "Can I blow away the cache on the server side?" Technically speaking, there is no tool to go onto the server and wipe out any data for a particular user that is cached. However, any time a user updates a file, the validation key and the modification time stamp on that file are modified. This means if you add it, remove it, or change permissions to it, a new key is generated. And every time a user attempts to load a dataset, they will always get the most up to date information.

When others consume your data, any request made against updated datasets will get encrypted with new keys. If you are trying to consume someone else's data and you have outdated keys, and your permissions to the data were removed, you will no longer be able to access the data.

17.j. Private Data Sharing within a GeoHub

Private data sharing is a valuable feature that may be enabled by organizations and data providers who purchase and implement GeoHubs.

17.k. How is security ensured in ERDAS TITAN?

ERDAS TITAN uses a combination of SSL and per-dataset encryption to protect secure sensitive data traveling through the ERDAS TITAN network. All network traffic flows through the GeoHub, which enforces the data security policies set by individual users and the system administrator.

17.l. Is Security validated in TITAN?

ERDAS contracted with a security and systems integrator to perform a full security audit for ERDAS TITAN. This report is available upon request.

17.m. What is the DMCA?

The Digital Millennium Copyright Act (DMCA) is a United States copyright law concerned with what the network provider can control with regards to copyright infringement on the Internet, and what control is exerted over users' behavior, online privileges, file sharing, or file storage in a particular virtual environment.

17.n. What is DMCA Safe Harbor?

DMCA 'safe harbor' provisions are designed to shelter service providers from the infringing activities of their customers. If a service provider qualifies for the safe harbor exemption, only the individual infringing customer is liable for monetary damages; the service provider's network through which they engaged in the alleged activities is not liable.

17.o. How do we plan to manage file sharing violations, in compliance with DMCA?

ERDAS takes allegations of copyright infringement seriously. We have implemented the notice-and-takedown procedures authorized by the Digital Millennium Copyright Act , 17 U.S.C. §512.

17.p. Are their safeguards in place so the ERDAS TITAN Network guarantees uptime?

The ERDAS TITAN Network runs from a dedicated hosting facility, one that specializes in dedicated servers for high-traffic image and video intensive web sites. Their San Jose datacenter in Silicon Valley is equipped with redundant backup UPS power, diesel generators, direct switch-port connections, and 100 Mbps to 1 Gbps Internet backbone connections.

ERDAS provides backup for the ERDAS TITAN Network at ERDAS offices in Atlanta. In preparation for any sizeable issues encountered at the data center, ERDAS is prepared to flip a switch and run the ERDAS TITAN Network from ERDAS until the issue is resolved.

18. How do I set up an autonomous Isolated Network that is not connected to the ERDAS TITAN Network?

The GeoHub may also be implemented in a private and isolated network, and function with no connection to the ERDAS TITAN Network. This deployment requires a ERDAS TITAN Master Server to enable the autonomous network. A Master Server manages the user profile and subscription data for the entire network. The Master Server handles GeoHub and individual registrations, takes login requests and authenticates the users. The Master Server is also the component that allows communication between GeoHubs.

18.a. Can I set the Master Server and a GeoHub up on the same server?

We do not recommend this, but and there are pros and cons to setting these up on the same server:

1. Cons:

- a. Creates a higher resource load on that server, and the Master Server can't support as many users and GeoHubs simultaneously as two separate servers could
 - b. If that GeoHub on the server gets slammed with users the entire network gets slammed as well
2. Pros:
- a. Communication between that GeoHub and the Master Server is faster

19. HTTP Traffic



19.a. How is data transported in ERDAS TITAN?

ERDAS TITAN requires HTTP traffic over standard ports 80 and 443.

ERDAS supports the use of ports 80 or 443 in a typical scenario for the GeoHub, depending on the GeoHub configuration. However, the software can be configured to use any port for the GeoHub service, so it could be anything from 1024 to 65536. If organizations choose to run their GeoHubs on other ports, however, they will need to inform their subscribers and manage this scenario themselves. Their subscribers would need to know their GeoHub is running on a different port, and would also need to handle the different firewall configurations.

The Master Server must be run over port 443.

19.b. What port does the public ERDAS TITAN Network run on?

Our public ERDAS TITAN Network GeoHub and the Master Server run on port 443.

20. Preferences

20.a What is the difference between having 'Automatically sign in' checked on the Login dialog, and 'Start ERDAS TITAN Client automatically when Windows starts' in GeoIM Preferences?

- 'Automatically sign in:' When the GeoIM is run, it will automatically try to sign you in, given that you have previously created a passport and saved credentials. This option is available to you regardless if you start the GeoIM manually or if you have it start when the machine starts.
- 'Start ERDAS TITAN Client automatically when Windows Starts:' This preference determines whether or not to start up the ERDAS TITAN Client applications whenever you log into your Windows account. Without this option, you would have to start the client manually every time. Note, this option does not control whether you are automatically signed in or not.

21. Non Functional & General Questions

21.a. How can I get the latest ERDAS TITAN server products?

All TITAN Server products, including Master Server, GeoHub and Web Cache Servers, are available for download at www.erdas.com, under Support->Downloads. A configuration guide is available with the download.

21.b. What are recommended hardware and software requirements for TITAN server and client products?

TITAN Client

Item	Requirement
Computer/Processor	2GHz
Memory	1GB System RAM

Display	128MB VRAM OpenGL Graphics Card
Minimum Resolution	800 x 600 x 24bit colors
Operating System	Microsoft Windows XP Professional SP2
Operating System	Windows Vista

TITAN Servers

Item	Requirement
Server	Dell SC1435 or PowerEdge 2950 or equivalent
Memory	4 GB RAM
Computer/Processor	Modern Quad Core CPU or Multi-CPU
Internet	T1 or better internet connection
Network Adapter	1 GB / sec
Server Operating System	Linux Red Hat 5.0
Server Operating System	Linux CentOS 5.1.0-2
Server Operating System	Windows Server 2008

21.c. Does a more powerful CPU mean better performance for the Server?

A more powerful CPU will have an effect on TITAN Server products, but actually other factors such as network card and bandwidth play a great role in performance. Also, there are a variety of other factors (including transaction volume, request variability, number of online users, etc) that can affect performance as well, making performance benchmarks difficult to ascertain.

21.d. What are bandwidth requirements for TITAN Server products and TITAN Client?

- Server products: Network Adapter: 1 GB / sec
- TITAN Client: A Cable or DSL connection, a minimum of 256KB/s. The more bandwidth you have the faster you can stream the imagery. I wouldn't recommend a modem though!

21.e. What is required disk space and disk performance for the GeoHub?

The GeoHub only supports memory based caching, so the only disk space requirement is in support of the installation.

21.f. Why is GeoHub not supported on Windows Server 2003?

During development, the TITAN Development Team detected a memory leak in Windows Server 2003, that apparently (although not confirmed) is associated with running Apache Tomcat. We are not aware that Microsoft will fix this memory leak in Windows Server 2003 anytime soon; therefore, ERDAS will not be supporting this platform. However, we will be supporting Windows Server 2008 with the August 2008 release of TITAN.

22. What is the next evolution of ERDAS TITAN?

The next evolution of ERDAS TITAN will be on the Web, enabling rich experiences in social networking, profile sharing, mapping functionality and e-commerce for ERDAS TITAN users and communities.



23. What are some future features that will be available?

- ERDAS TITAN on the web
 - Ecommerce, Amazon style Search/Register/Preview/Add to Cart/Buy
 - Web Profiles
 - Data ported from ERDAS TITAN
- Consumption of a variety of web services (WFS, WFS-T)
- Symbology
- Live camera feed support
- Political boundaries and roads
- Flight path editor to create and share 3D fly-thru's



24. How do I get more information?

- ERDAS TITAN Blog: <http://erdastitan.blogspot.com/>
- ERDAS TITAN Website: www.erdas.com/titan
 - Product Download (~ 10MB in size)
 - Screenshots
 - Tutorial Movies
 - Color Brochure PDF
 - Product Description
 - White Papers
- ERDAS TITAN Forum: www.erdas.com/titanforum
 - Utilize the ERDAS TITAN Forum for submitting enhancement requests, asking questions, sharing information and submitting bugs.