

# ERDAS Solutions for Distributed Common Ground Station (DCGS)

**White Paper**



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Since Desert Storm, ERDAS has provided the tactical community with advanced imagery intelligence and GEOINT processing solutions that have made American, Commonwealth, and Coalition warfighters more effective in battle and in peace. Now, with a complete, geospatially-enabled, service oriented architecture, ERDAS brings the tactical community, through the Distributed Common Ground Station (DCGS) program a host of next generation solutions that promise to increase situational awareness, ensure accuracy, and reduce mission latency.

### Background

ERDAS is a major player in the legacy/heritage tactical systems that have been deployed for all of the US military services, as well as those around the world. ERDAS has also been adopted as a component within the DCGS architecture, which is to absorb these legacy/heritage tactical system capabilities and move them forward into a dynamic Service Oriented Architecture (SOA). ERDAS IMAGINE was recognized in the DCGS Pathfinder as the leading commercial off the shelf (COTS) geospatial analysis and exploitation solution. However, the extensive use of desktop Electronic Light Tables (ELTs), such as the ERDAS IMAGINE GLT, throughout the GEOINT community has created an ad hoc processing architecture overly dependent upon massively complex networks required to sustain numerous individual data silos, filled with many terabytes of redundant image pixels. These inefficiencies are magnified when different ELT packages (or even different versions of the same ELT) produce varying results when exploiting the exact same image.

The overwhelming logistics and costs of fielding new stand alone desktop applications across the enterprise almost ensures that no two analysts will necessarily be working with the same version of software at any given time. To achieve real accuracy and maximize exploitation efficiency as updated applications are made available, they must be capable of being deployed simultaneously across the GEOINT community. These applications must provide high-speed exploitation on imagery as it is being pulled directly from a central server image library. This problem demands a new approach towards imagery exploitation based upon a SOA and a robust imagery management solution capable of efficiently parsing only those image pixels needed for exploitation. ERDAS is currently addressing these issues on three fronts: enterprise management, data collaboration and visualization, and enterprise image processing.

## DCGS

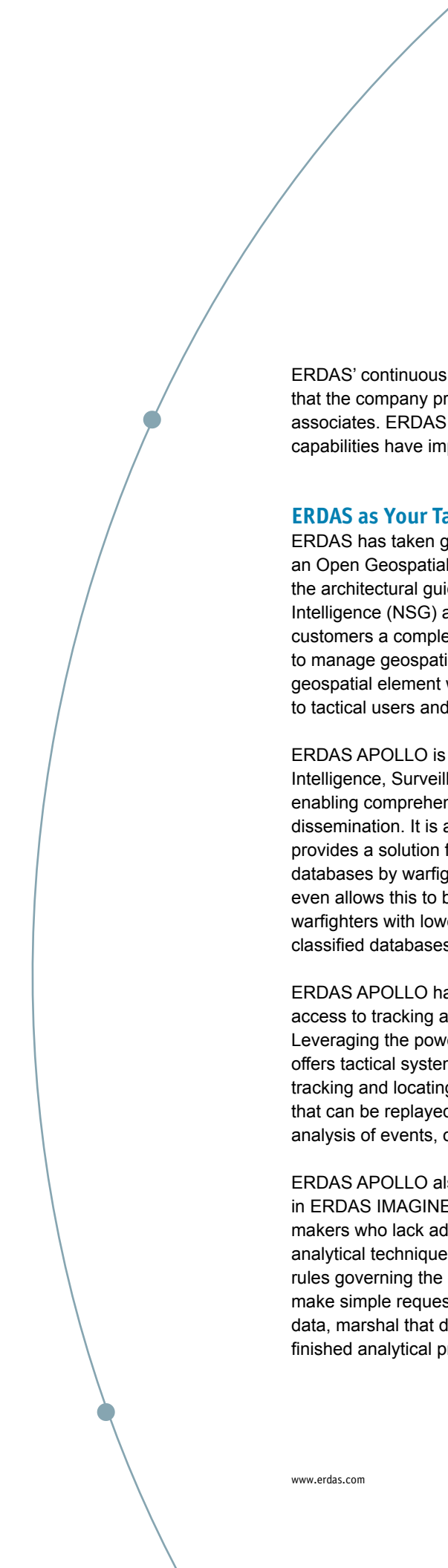
DCGS was first devised by the Defense Airborne Reconnaissance Office (DARO) as its vision as the integrated architecture of all ground/surface systems used by the Department of Defense. DCGS integrates Imagery Intelligence (IMINT) systems into a single system, the Common Imagery Ground/Surface System (CIGSS), and Signals Intelligence (SIGINT) systems into the Joint Airborne SIGINT Architecture (JASA). CIGSS and JASA architectures together make up DCGS. DCGS will be completed with the integration of these two, as well as necessary MASINT capabilities. The DCGS sensor family is currently comprised of fixed and deployable multi-source ground processing systems that support a range of intelligence, surveillance, and reconnaissance systems such as national and commercial satellite systems, U-2, Unmanned Aerial Vehicles (UAVs), and F-16 Theater Airborne Reconnaissance Systems (TARS).

One of the goals of DCGS is to provide an intelligence sharing capability offering commanders and analysts at different locations immediate access to each other's intelligence imagery and other services via the DCGS Integration Backbone (DIB). Stated another way, the DIB is to create a global collaborative intelligence enterprise, providing users immediate access to more than 80 percent of the imagery collected and produced in the world, along with a wide range of other intelligence and operational data that may come from the ground or sea. This is to be done through common interface standards and a SOA. The DIB is to connect users in distant locations and provides clearance level based security for access to a multitude of intelligence sources. SOA also facilitates the interface with other SOA-based systems and assures the continuous evolution of web of capabilities.

## ERDAS IMAGINE® and DCGS

ERDAS is an important partner in DCGS, and our flagship product, ERDAS IMAGINE, is deployed on the legacy/heritage tactical systems that are scheduled to become part of DCGS by 2011. ERDAS IMAGINE has proven its capabilities and utility in CTIS and TPC heritage systems, and ERDAS aims to continually evolve its product offerings to address evolving DCGS program needs.

ERDAS IMAGINE software earned top ratings from the National Geospatial Intelligence Agency's (NGA) Pathfinder Program four years running. NGA designed the Pathfinder Program to find the best of breed commercial solutions to meet critical information technology requirements inside the US DoD and Intelligence Community. In prior years, NGA independently determined that ERDAS IMAGINE was the top rated solution for: 3D scene visualization, automated feature extraction and assisted target recognition, geospatial data production and exchange, multi/hyper-spectral imagery exploitation applications and tools, and the leading replacement candidate commercial electronic light table for the Intelligence Community.



ERDAS' continuous achievement of top ratings in the Pathfinder program validates that the company provides the best commercially available solutions to NGA and its associates. ERDAS IMAGINE has only become more powerful since then, and its capabilities have improved greatly, with many new Defense-specific features.

### **ERDAS as Your Tactical Enterprise Solution**

ERDAS has taken great strides to integrate its ERDAS IMAGINE functionality into an Open Geospatial Consortium (OGC) compliant SOA environment, in line with the architectural guidelines adopted by the US National System for Geospatial Intelligence (NSG) and the larger DoD/IC. Indeed, ERDAS has also brought its customers a complete OGC SOA platform, ERDAS APOLLO, which can be deployed to manage geospatially enabled mission data. Arguably, all mission data has a geospatial element which must be managed properly, or else it is of limited use to tactical users and decision makers.

ERDAS APOLLO is a solution for your tactical enterprise's time dominant Intelligence, Surveillance, and Reconnaissance (ISR) management needs – enabling comprehensive imagery cataloging and the fastest possible imagery dissemination. It is also a solution for managing your basic geospatial data. It also provides a solution for enabling real-time update of operational and intelligence databases by warfighters making direct observations in the field. ERDAS APOLLO even allows this to be done in a cross-domain security environment, allowing warfighters with lower clearance levels to access lower classified data from highly classified databases – and contribute back to these databases directly from the field.

ERDAS APOLLO has also been used to provide OGC compliant web service access to tracking and locating data relating the mobile tactical objects. Leveraging the power of enterprise class spatial databases, ERDAS APOLLO offers tactical system designers the opportunity to provide users near-real time tracking and locating solutions while also providing an archive of track data history that can be replayed for the purposes of after action reports, forensic intelligence analysis of events, or insight into patterns and practices of the adversary.

ERDAS APOLLO also provides the ability to publish your “know how,” as embodied in ERDAS IMAGINE spatial models, to the enterprise. Operators and decision makers who lack advanced geospatial/remote sensing training can execute analytical techniques that see everyday usage. The models are published with the rules governing the data that must be used, making it possible for a novice user to make simple requests to a server smart enough to properly discover the necessary data, marshal that data, execute the model, and provide the end user with the finished analytical product.

ERDAS has yet another offering that more directly addresses geospatial collaboration and information sharing across a network of tactical operators and decision makers, leveraging the power of social networking technologies. ERDAS TITAN, while it supports the consumption OGC web services and the dynamic publishing of local data as OGC web services, was built primarily to allow users within a network to mashup data from their own desktop and someone else's desktop – subject to fine grained, user established access controls. Moreover, it enables a user to view another's "MyWorld", as they have composed it. No other solution exists that can enable tactical users to rapidly develop User Defined Operational Pictures (UDOP) from data that is local to either themselves or a collaborator, as well as remote data served from OGC web services.

The ERDAS SOA solution is ideally suited to meet DCGS future needs and is the type of technology that will revolutionize the way the DCGS Integrated Backbone (DIB) analyzes intelligence and conducts business. Our new offerings make global geospatial collaboration the new model for conducting analysis and geospatial product generation and are a perfect fit for DCGS.

### Security in Your Tactical SOA

DCGS fundamentally relies upon a secure, enterprise spatial data infrastructure. As such, ERDAS has invested heavily in ensuring that we offer the most comprehensively secure, OGC compliant service oriented architecture on the market. ERDAS has supported DoD PKI/LDAP based authentication and authorization in its products for many years. More recently, ERDAS APOLLO began to support Oracle's Label Security and its Cross Domain Security Solution to empower customers to deploy an OGC SOA in a cross-domain environment, spanning networks of different classifications.

For years, the same spatial data has been repeatedly replicated and hosted on multiple security domains for users with different clearances to access. This has led to complicated and costly schemes for upward and downward synchronization of data. Moreover, it has required the acquisition of multiple hardware and software instances, which naturally require their own operations and maintenance (O&M) budget.

ERDAS APOLLO has been specially designed to support Oracle Label Security, and thereby Oracle's Cross Domain Security Solution (CDSS). The CDSS is in process for a DCID 6/3 PL4 by the Joint Cross Domain Management Office. This label secure environment enables data of different classifications to reside in the same database, enabling users with different roles and clearance levels to access the same database, accessing only the data they need, matching their security clearances.



## OGC SOA

As DCGS migrates into a SOA environment, it has actively been working with OGC web services through activities such as Empire Challenge. The OGC is a non-profit, international, voluntary consensus standards organization that is leading the development of standards for geospatial and location based services. OGC is an international industry consortium of more than 350 companies, government agencies and universities participating in a consensus process to develop publicly available interface specifications. OpenGIS® specifications support interoperable solutions that “geo-enable” the Web, wireless and location-based services, and mainstream IT. The specifications empower technology developers to make complex spatial information and services accessible and useful with all kinds of applications.

OGC offers a mature and robust geospatial web services architecture. This service oriented architecture is particularly useful for managing the discovery (via the Catalog Service/CS-W specification), access (via the Web Coverage Service/WCS specification for imagery and the Web Feature Service/WFS for features) and portrayal (via the Web Map Service/WMS specification) of imagery. These and other OGC web services have been adopted by the US Department of Defense as part of their technical baseline, based on over a decade of investment by the US Defense and Intelligence Communities in the OGC.

As a member of the Board of Directors, Planning Committee, Architecture Board, and many Technical Committee working groups, ERDAS has for years worked with the Defense and Intelligence Communities to drive OGC standards to meet mission needs. ERDAS, as a COTS vendor, will be inserting OGC web service support into the DCGS architecture. ERDAS looks forward to partnering with the DCGS Program Office and system integrators to ensure that OGC web services provide maximum mission impact.

## Conclusion

Because of our experience with DCGS thus far, and ERDAS' recognized expertise in the geospatial enterprise market, we are uniquely positioned to offer the partners and stakeholders in the DCGS community a fast-paced connectivity path to common and shared expertise and products. Additionally, ERDAS APOLLO, ERDAS TITAN and our other products are already deployed in a number of agencies throughout the United States and abroad, and are ideal for data storage, access, and discovery of hundreds of commonly used remote sensing and geospatial data types. ERDAS APOLLO provides an OGC portal for the US Defense community to discover and download an ever-growing body of globally-captured data, without the need for overwhelming local storage space, and would be a considerable advantage to include in meeting DCGS mission's goals.