

CUBIC'S GEOSPATIAL XD SOLUTION (GXDS) (REACH DOWN)

Cubic's Geospatial Cross Domain Solution (GXDS) enables JWICS and SIPRNet users to pull data from lower classification repositories up to their respective network levels. Cubic's Reach Down GXDS can be adapted to any variety of ISR data types including commercial satellite imagery, FMV, Biometrics, Document and Media Exploitation (DOMEX) and DevOps.

The GXDS solution was originally developed to satisfy the Army GeoSpatial Center customers' requirement to make their Buckeye LIDAR and other unclassified ISR data "discoverable and retrievable" by SIPRNet and JWICS users. Cubic's GXDS solution allowed SIPRNet and JWICS users to "look down" into catalogs of unclassified Buckeye LIDAR, and pull it up from those catalogs to their respective classified networks for analysis, targeting or other needs

Cubic designed the GXDS solution to operate using Open GeoSpatial Consortium (OGC) standard service calls. It was quickly extended to provide cross domain connectivity to other products as it supports any OGC compliant ISR service, including servers from ESRI, DigitalGlobe, Pixia, Terra Bella, TerraPixel, Vricon and others.



Since Cubic's GXDS solution utilizes this open standard, the data is available for viewing and processing on a wide number of clients and Geographic Information Systems (GIS), including Google Earth, ArcGIS, and QGIS, PlanetGIS Explorer and many others. This capability has been demonstrated at the Director of National Intelligence's (DNI's) Open Source Center (OSC), and for the National Geospatial Intelligence Agency (NGA's) GEOINT Services Division in the Research Lab Environment (RLE) where Cubic demonstrated accessing source data, as well as commercial imagery data, including data from Amazon Web Services and Amazon Simple Storage Solutions (S3) buckets.

THE CHALLENGE

Programs and missions challenged with collection and dissemination of geospatial ISR data often end up replicating and hosting it on multiple security domains. This mode of operation complicates data replication logistics, adds redundancy, increases hardware, software and bandwidth costs, and leads to a lag in timely data distribution while adding additional security risk. Often geospatial data resides on the unclassified network, and a cross-domain solution is needed to make this data discoverable and retrievable for customers operating on other unclassified, Secret, and Top Secret Special Compartmented Information (TS/SCI) levels.

THE SOLUTION

Cubic's Cross Domain Solutions has adapted cross-domain technology to demonstrate this ability through a secure bi-directional cross-domain web proxy from unclassified to both Secret and TS/SCI networks. This Geospatial Cross Domain Solution (GXDS) enables users on the TS/SCI, Secret or unclassified networks to utilize an Open Geospatial Consortium (OGC) standard web service request to inspect its metadata, visually browse it, and retrieve this data for download. Setting up the architecture like this carefully restricts all traffic across the GXDS to strictly OGC web service calls.

ONE IMPLEMENTATION

The implementation of OGC standard service calls uses GeoNetwork on the high side and makes use of its harvesting capabilities to issue periodic GetCapabilities requests to the GeoServer on the low side that contain the data. GeoServer software allows the secure sharing and editing of geospatial data, and GeoNetwork provides a defined set of search and discovery tools. GeoNetwork will issue GetCapabilities requests to the GeoServer and store the retrieved metadata in its catalog. When a high side user discovers a dataset in the catalog of interest, the OGC client they are using will issue requests via the GXDS and the GeoServer will respond back with the requested data. While requests for data can be originated on all three security domains, the GXDS is only deployed between TS/SCI and Unclassified, and/ or Secret and Unclassified networks.

GXDS DATA FLOW

Data flow between the security domains, via the GXDS, occur as follows:

- Secret or TS/SCI user will log on to their terminal and connect to the GeoNetwork application.
- An operation request is sent to the XD-10G guard where it is validated prior to being forwarded to the XD-1000 guard and subsequently transferred from TS/SCI (high) to unclassified (low).
- Once the operation request is on the low side of the XD-1000 guard, it will be sent back to the low side of the XD-10G.
- The XD-10G then forwards the request to the GeoServer for processing.
- The GeoServer will process the request and send the results back to the XD-10G for transfer from low to high.

The web service filter currently supports 15 OGC compliant calls (others can be added):

- Web Map (Tile) Service (WMS / WMTS)
 - GetCapabilities, GetMap, GetFeatureInfo, GetLegendGraphic, DescribeLayer, GetStyles, GetTile
- Web Feature Service (WFS)
 - GetCapabilities, GetFeature, DescribeFeatureType
- Web Coverage Service (WCS)
 - GetCapabilities, GetCoverage, DescribeCoverage

The file transfer filter currently supports 200+ filetypes including .gif, .tif (including GeoTIFF format), .png, .jpg, .las, .ppts, .xlsx, .dbf, .shp, .shx, .sbn, .sbx, .pi, .mpg, .zip, .pdf, .docx, .json, .yaml, .geojson, .jar and many other GIS filetypes.

