EGC - Web Services Strategy
VT Enterprise GIS Consortium (EGC)

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Revision History

Version	Date	Author(s)	Revision Notes	EGC Approval
0.1	5/4/2012	Steve Sharp	Draft for EGC review	-
0.2	6/4/2012	Steve Sharp	Draft for EGC review	-
1.0	6/26/2012	Steve Sharp + EGC	Final	Approved by EGC at 7/9/2012 meeting
1.1	8/28/2012	Steve Sharp + Erik Engstrom	Modified "Folder Hierarchy and Naming Convention" in Attachment A	-
1.2	9/16/2012	Steve Sharp + EGC	Changed "basemap services" to "map services". Change BMAP prefix to MAP. Remove "Other services" category from document. Added notion of a "EGC Web Services Registry". Made additional modifications to service naming convention.	Approved by EGC via E-vote (email).
2.0a	10/4/2013	Steve Sharp + EGC	Revised draft addressing version naming, life cycle policies, https/ssl, service maintenance, AGS upgrades, and AGO strategy.	
2.1	1/2/2014	Steve Sharp + EGC	Add VTPARCELS and IMGINDEX as new Map Services	Approved by EGC via E-vote (email). ANR, VAAFM, AHS, VTrans, E911, and VCGI voted "YES". ACCD, DII, and VEM did not cast a vote.
2.2	11/24/2014	Steve Sharp + EGC	Added LIDAR services. Changed IMGINDEX to ALLIMAGERY service	Approved by EGC via E-vote (email). ANR, VAAFM, VTrans, E911, DII, and VCGI voted "YES". ACCD, AHS/VDH and VEM did not cast a vote.

Summary

This document articulates a web services strategy for the State of Vermont's Enterprise GIS system. This strategy focuses on geospatial web services supporting desktop, web, and mobile applications. The Enterprise GIS Consortium (EGC) drafted this strategy in consultation with member agencies to facilitate the development of shared web services to support agency needs and reduce duplication of effort.

Vision: EGC members will develop, maintain, and leverage a comprehensive set of geospatial web services supporting the needs of State agencies and their clients.

User Audience:

- VT State Government users
- Public users[1]

Objectives: The Enterprise GIS Web Services Strategy will

- Supports the needs of EGC member organizations
- Reduce redundancy by deploying commonly needed web services

Target Use Cases: The Enterprise GIS Web Services Strategy is designed to support the following use cases

- Desktop mapping applications such as ArcGIS Desktop and Open Source solutions (OGC compliant)
- Web-based mapping applications using ESRI[2] and OGC[3] APIs
  Mobile mapping applications using ESRI and OGC APIs

Web Service Categories:

- Map services
- Image services
- Geodata Services
- Geocode services
- ArcGIS Online[4]

[1] Access to the Enterprise GIS Web Services defined in this document may be limited to state agencies and organizations depending on the constraints of GIS server hardware, software, and network capacity. Web Services outlined in this document do not inherently indicate access by the general public or other GIS stakeholders outside of the EGC due to possible constraints on state agency GIS server infrastructure.

[2] Environmental Systems Research Institute

[3] Open Geospatial Consortium

[4] Esri ArcGIS Online maps and services

Map Services

Map services offer access to map and layer content. Map services can either be cached or dynamic. A map service that fulfills requests with pre-created tiles from a cache instead of dynamically rendering part of the map is called a cached map service. A dynamic map service requires the server to render the map each time a request comes in. Map services using a tile cache can significantly improve performance while delivering maps, while dynamic map services offer more flexibility. These are generally implemented as ESRI ArcGIS Server "map services".

Map Services Plan

Supported Use Cases

- Desktop mapping applications needing fast and consistent looking maps
- Web-based mapping applications needing fast and consistent looking maps
- Mobile mapping applications needing fast and consistent looking maps

Requirements

- Support for ESRI desktop, web, and mobile clients
- Support for OGC compliant desktop, web, and mobile clients
- Support applications requiring pre-cached tiles
- Support applications requiring dynamic layers
- Support those using the VT State Plane Coordinate System and Web Mercator (Google/Bing) system.
- Standardized look-and-feel

Plan: The following list of map services is designed to support the needs of state agencies

Service	Characteristics	Type of Web Service	Service Provider
MAP_VCGI_BASEMAP_SP_NOCACHE	Many of the most common basemap elements. VT State Plane Meters.	map service	VCGI
MAP_VCGI_BASEMAP_WM_ NOCACHE	Many of the most common basemap elements. Web Mercator.	map service	VCGI
MAP_E911_STREETS_SP_CACHE	Streets and highways. VT State Plane Meters.	map service	E911/VTrans

Service	Characteristics	Type of Web Service	Service Provider
MAP_E911_STREETS_WM_CACHE	Streets and highways. Web Mercator.	map service	E911/VTrans
MAP_E911_BLDGS_SP_CACHE	Buildings. VT State Plane Meters.	map service	E911
MAP_E911_BLDGS_SP_CACHE	Buildings. Web Mercator.	map service	E911
MAP_ANR_VTHYDRO_SP_CACHE	Lake, ponds, rivers, and streams. VT State Plane Meters.	map service	ANR
MAP_ANR_VTHYDRO_WM_CACHE	Lake, ponds, rivers, and streams. Web Mercator.	map service	ANR
MAP_VCGI_CONTOURS_SP_CACHE	Contours. VT State Plane Meters.	map service	VCGI
MAP_VCGI_CONTOURS_WM_CACHE	Contours. Web Mercator.	map service	VCGI
MAP_VCGI_CONTOURS_SP_NOCACHE	Contours. VT State Plane Meters.	map service	VCGI
MAP_VCGI_CONTOURS_WM_NOCACHE	Contours. Web Mercator.	map service	VCGI
MAP_VCGI_HILLSHD_SP_CACHE	Color hillshade. VT State Plane Meters.	map service	VCGI
MAP_VCGI_HILLSHD_WM_CACHE	Color hillshade. Web Mercator.	map service	VCGI
MAP_VCGI_HILLSHDPLUS_SP_CACHE	Color hillshade, contours, and hydro. VT State Plane Meters.	map service	VCGI
MAP_VCGI_HILLSHDPLUS_WM_CACHE	Color hillshade, contours, and hydro. Web Mercator.	map service	VCGI
Old USGS 24K topo maps	Old USGS 24K topographic maps. Web Mercator.	NA	ESRI
MAP_VCGI_USTOPO_SP_CACHE	New “US Topo” maps produced by USGS. VT State Plane Meters.	map service	VCGI
MAP_VCGI_USTOPO_WM_CACHE	New “US Topo” maps produced by USGS. Web Mercator.	map service	VCGI
MAP_VCGI_VTPARCELS_SP_NOCACHE	Merged VT Parcels data (VTPARCELS) exposed as a map service. VT State Plane Meters	map service	VCGI
MAP_VCGI_VTPARCELS_WM_NOCACHE	Merged VT Parcels data (VTPARCELS) exposed as a map service. Web Mercator.	map service	VCGI
MAP_VCGI_ALLIMAGERY_WM_NOCACHE	All VT Imagery and imagery indexes available from VCGI. Web Mercator	map service	VCGI
MAP_VCGI_ALLIMAGERY_SP_NOCACHE	All VT Imagery and imagery indexes available from VCGI. VT State Plane Meters	map service	VCGI

Service	Characteristics	Type of Web Service	Service Provider
ESRI Community Basemap*[5]	ESRI Community Basemap enriched with VT GIS data. Web Mercator only.	map service	ESRI and EGC partners necessary to enrich services with VT GIS data.
ESRI Basemaps*	A variety of ESRI basemaps. Web Mercator only.	NA	ESRI
Bing Basemaps*	A variety of Bing basemaps. Web Mercator only.	NA	Microsoft (Bing services)
Google Basemaps*	A variety of Google basemaps. Web Mercator only.	NA	Google
MAP_VCGI_LIDARHILLSHD_SP_CACHE_v1	Color hillshade from LiDAR DEM data. VT State Plane Meters.	map service	VCGI
MAP_VCGI_LIDARHILLSHD_WM_CACHE_v1	Color hillshade from LiDAR DEM data. Web Mercator.	map service	VCGI
MAP_VCGI_LIDARHILLSHDPLUS_SP_CACHE_v1	Color DEM hillshade & contours from LiDAR with hydro. VT State Plane Meters.	map service	VCGI
MAP_VCGI_LIDARHILLSHDPLUS_WM_CACHE_v1	Color DEM hillshade & contours from LiDAR with hydro. Web Mercator.	map service	VCGI
MAP_VCGI_LIDARCONTOURS_SP_CACHE_v1	Contours derived from LiDAR DEM. VT State Plane Meters.	map service	VCGI
MAP_VCGI_LIDARCONTOURS_WM_CACHE_v1	Contours derived from LiDAR DEM. Web Mercator.	map service	VCGI

[5] * Licensing limitations may apply.

Image Services

Image services provide access to imagery and other remotely sensed data captured by airborne or satellite based platforms. However, image services are also used to provide access to other raster products such as LiDAR derivatives. These are generally implemented as ESRI ArcGIS Server "image services".

Imagery Services Plan

Supported Use Cases

- Desktop applications needing fast rendering imagery
- Web-based mapping applications needing fast rendering imagery
- Mobile mapping applications needing fast rendering imagery

Requirements

- Support for ESRI desktop, web, and mobile clients
- Support for OGC compliant desktop, web, and mobile clients
- Support those using the VT State Plane Coordinate System and Web Mercator (Google/Bing) system.
- Support access to historical VT ortho imagery
- Support applications requiring access to the "best available imagery" as pre-cached tiles
- Support "mashups" with other 3rd party imagery services (eg: Google, Bing, and ESRI)

Plan: The following list of imagery services is designed to support the needs of state agencies

Service	Imagery	Year	Service Provider	Type of Web Service	Coordinate System
	NAIP Imagery				
IMG_VCGI_NAIP_SP_NOCACHE	NAIP (1m)	All	VCGI	image service[6]	SP only
IMG_VCGI_NAIPCIR_SP_NOCACHE	NAIP (CIR only extract)	All	VCGI	image service	SP only
	VT Orthophotos				

[6] ArcGIS Server "Image Extension" image service. It is anticipated that this type of service is faster than an ArcGIS Server "map service".

Service	Imagery	Year	Service Provider	Type of Web Service	Coordinate System
IMG_VCGI_BW1994_2000_SP_NOCACHE	1:5000 B&W VT Orthos – Vintage 1	1994 - 2000	VCGI	image service	SP only
IMG_VCGI_BW2006_2010_SP_NOCACHE	1:5000 B&W VT Orthos – Vintage 2	2006 – 2010	VCGI	image service	SP only
IMG_VCGI_BW2011_2015_SP_NOCACHE	1:5000 B&W VT Orthos – Vintage 3	2011 - 2015	VCGI	image service	SP only
IMG_VCGI_CLR2011_2015_SP_NOCACHE	1:5000 Color VT Orthos – Vintage 3	2011 - 2015	VCGI	image service	SP only
IMG_VCGI_CLR2011_SP_CACHE IMG_VCGI_CLR2011_WM_CACHE	2011 1:5000 Color VT Orthos	2011	VCGI	image service cached tiles	SP + WM
IMG_VCGI_CLR2012_SP_CACHE IMG_VCGI_CLR2012_WM_CACHE	2012 1:5000 Color VT Orthos	2012	VCGI	image service cached tiles	SP + WM
IMG_VCGI_CIR2011_2015_SP_CACHE	1:5000 Color Infrared VT Orthos – Vintage 3	2011 - 2015	VCGI	image service	SP only
	"Best of" Imagery				
IMG_VCGI_BW_SP_CACHE IMG_VCGI_BW_WM_CACHE	Best of B&W - VCGI	various	VCGI	image service cached tiles	SP + WM
IMG_VCGI_CLR_SP_CACHE IMG_VCGI_CLR_WM_CACHE	Best of Color - VCGI	various	VCGI	image service cached tiles	SP + WM
NA	Best of Color - Google	various	Google	cached tiles[7]	WM only
NA	Best of Color - Bing	various	Microsoft	cached tiles	WM only
NA	Best of Color - ESRI	various	ESRI	cached tiles	WM only
IMG_VCGI_CIR_SP_NOCACHE IMG_VCGI_CIR_WM_NOCACHE	Best of Color Infrared	various	VCGI	image service	SP + WM

[7] Not supported by ArcGIS Desktop clients.

Service	Imagery	Year	Service Provider	Type of Web Service	Coordinate System
	Misc Imagery				
IMG_VCGI_BWMISC_SP_NOCACHE	Misc B&W imagery	various	VCGI	image service	SP only
IMG_VCGI_CLRMISC_SP_NOCACHE	Misc Color imagery	various	VCGI	image service	SP only
IMG_VCGI_CIRMISC_SP_NOCACHE	Misc Color Infrared imagery	various	VCGI	image service	SP only
IMG_VCGI_LIDARDEM_SP_NOCACHE_v1	All VT LiDAR DEMs rasters	various	VCGI	image service	SP only
IMG_VCGI_LIDARDSM_SP_NOCACHE_v1	All VT LiDAR DSMs rasters	various	VCGI	image service	SP only
IMG_VCGI_LIDARNDSM_SP_NOCACHE_v1	All VT LiDAR nDSMs rasters	various	VCGI	image service	SP only
IMG_VCGI_LIDARASPECT_SP_NOCACHE_v1	All VT LiDAR aspect rasters	various	VCGI	image service	SP only

Geocode Services

Geocoding is the process of finding associated geographic coordinates (often expressed as latitude and longitude) from other geographic data, such as street addresses, or zip codes (postal codes). With geographic coordinates the features can be mapped[8]. Geocoding services are frequency used in web and mobile mapping applications. Geocode services provide access to geocoding capabilities through a web services.

Geocode Services Plan

Supported Use Cases

- Desktop applications which need to geocode addresses (including batch geocoding)
- Web-based mapping applications needing to geocode addresses
- Mobile mapping applications needing to geocode addresses

Requirements

- Support for ESRI desktop, web, and mobile clients
- Support batch geocoding within ArcGIS Desktop
- Support geocoding in either VT State Plane Meters or Web Mercator

Plan

Service	Characteristics	Batch Geocoding?	Service Provider
GCS_E911_ESITE_SP	E911 ESITE "address points". VT State Plane Meters.	Yes	E911
GCS_E911_RDSRANGE_SP	E911 road address range geocoder. VT State Plane Meters.	Yes	E911
GCS_E911_RDSNAME_SP	E911 road name geocoder. Web Mercator.	Yes	E911
GCS_E911_COMPOSITE_SP	Composite geocoding cascading through ESITE, RDSRANGE, and RDSNAME.	Yes	E911
ESRI geocoders*[9]	Support geocoding of all US streets and highways.	No	ESRI

[8] http://en.wikipedia.org/wiki/Geocoding

[9] Licensing terms may apply.

Service	Characteristics	Batch Geocoding?	Service Provider
Google geocoder*	Support geocoding of all US streets and highways. Web Mercator only.	No	Google
Bing geocoder*	Support geocoding of all US streets and highways. Web Mercator only.	No	Microsoft

Geodata Services

ESRI's ArcGIS Server supports the creation of "geodata" services. A geodata service allows you to access an ESRI geodatabase through a local area network (LAN) or the Internet using ArcGIS Server. The service exposes the ability to perform geodatabase replication operations, make copies using data extraction, and execute queries in the geodatabase.

Geodata Services Plan

Supported Use Cases

- Desktop applications which need to extract copies of data.
- Data replication.
- Web-based mapping applications which need to extract copies of data.
- Mobile mapping applications which need to extract copies of data.

Requirements

- Support for ESRI desktop, web, and mobile clients
- Support access via OGC WFS and WCS services.
- Support VT State Plane Meters or Web Mercator
- Support EGC Data Exchange Protocol "geodata" services

Plan

Service	Characteristics	Service Provider
GDS_VCGI_SP	Geodata service providing access to GDB_VCGI database. VT State Plane Meters	VCGI
GDS_VCGI_WM	Geodata service providing access to GDB_VCGI database. Web Mercator	VCGI
GDS_ANR_SP	Geodata service providing access to GDB_ANR database. VT State Plane Meters	ANR
GDS_ANR_WM	Geodata service providing access to GDB_ANR database. Web Mercator	ANR
GDS_VTRANS_SP	Geodata service providing access to GDB_VTRANS database. VT State Plane Meters	VTRANS
GDS_VTRANS_WM	Geodata service providing access to GDB_VTRANS database.	VTRANS

Service	Characteristics	Service Provider
	Web Mercator	
GDS_E911_SP	Geodata service providing access to GDB_ E911 database. VT State Plane Meters	E911
GDS_E911_WM	Geodata service providing access to GDB_ E911 database. Web Mercator	E911

ArcGIS Online

Esri's ArcGIS Online (AGO) solution provides users with a set of foundation web services that are deeply integrated with Esri's ArcGIS Products. ArcGIS Online is composed of map services, task services, software developer kits (SDKs), an Online Sharing application and other content via the Web. EGC partners who already own an ArcGIS license (desktop or server) have an ArcGIS Online account. ArcGIS Online can be used by EGC members to share geospatial resources with the public and with other EGC partners.

ArcGIS Online Plan

Supported Use Cases

- Allow EGC partners to share Maps, Map Services, Layers, Tools, Apps, and Files.
- Allow the public to easily discover and access Maps, Map Services, Layers, Tools, Apps, and Files.
- Allow EGC partners to discover and access Maps, Map Services, Layers, Tools, Apps, and Files.

Requirements

- Support for ESRI desktop, web, and mobile clients.

Attachment A

EGC Web Services Deployment Standards for ArcGIS Server

Summary: This section outlines standards for the deployment of ArcGIS Server web services supporting the EGC's Web Services Strategy. These standards only apply to ArcGIS Server web services designed to support the EGC's Web Services Strategy. All EGC Web Services must be deployed by the "service provider" in a manner consistent with the specifications outlined in Attachment A.

EGC Web Services Registry: An EGC "Web Services Registry" will be established and used to catalog all shared EGC Web Services. New entries will be added by the "service provider".

Folder Hierarchy and Naming Convention: Each "service provider" must configure ArcGIS Server as follows for any EGC Web Services to choose to host.

1) Start **ArcGIS Server Manager** and log in.
2) Click the **Services** tab.
3) Create the following folder at the root[10]
    - **./EGC_Services**

NOTE: All other ArcGIS Server services created by the host agency for their own use should be stored outside of this directory.

Web Services Naming Convention: Service providers must use the following naming convention and deploy these services in the ./EGC_Services folder defined above.

- **Map Service:** MAP_<Agency>_<name>[11]_<SP|WM|UTM>_<CACHE|NOCACHE>_v<version#>
    - Example: MAP_VCGI _CONTOURS_SP_CACHE_v1

- **Image Service:** IMG_<Agency>_< name >_<SP|WM>_<CACHE|NOCACHE>_v<version#>

[10] "root" refer to the top folder within the ArcGIS Server services stack.

[11] The <name> portion is limited to a maximum of 12 characters.

- Example: IMG_VCGI _VTCLR_SP_CACHE_v1

- **Geocode Service:** GCS_<Agency>_< name >_<SP|WM>_v<version#>
  - Example: GCS_E911_STREETS_SP_v1

- **Geodata Service:** GDS_<Agency>>_<SP|WM>_v<version#>
  - Example: GDS_VCGI_SP_v1

Version Management: Each web service must be assigned a version number (v#) as defined in the naming convention above. The 1st release of a service should be tagged as "v1". As "substantive"[12] changes are made to the service the version number should be incremented by 1 (eg: v2). The previous version should be retained as outlined in the Life Cycle Support Policy guidelines outlined below.

Life Cycle Support Policy: A Life Cycle Support Policy is designed to help communicate to users the technical resources available during a web service's life span and to provide advanced notification of planned changes to services offered by EGC partners. Agencies choosing to publish/host EGC services must publish a Life Cycle Support Policy using the *EGC Life Cycle Support Policy* template. Users must be given a minimum of 90 days notice before a specific service is retired. Notices should be sent out via the VGIS-L listserv. For example, if MAP_VCGI_BASEMAP_v1 was upgraded to MAP_VCGI_BASEMAP_v2, the v1 version would need to be retained for at least 90 days. VCGI's Life Cycle Support Policy would be updated to reflect this change, and VCGI would send notice out on VGIS-L.

ArcGIS Server Upgrades: ArcGIS Server upgrades (eg: new versions, service packs) can impact the ability of client software (eg: ArcGIS Desktop, web and mobile apps) to utilize AGS services. As a result upgrades can break client applications. Therefore agencies choosing to publish/host EGC services must give 90 days' notice before they upgrade (or patch) ArcGIS Server instance(s). The notice should be given by 1) updating their Life Cycle Support Policy, 2) and notify users via VGIS-L of the pending upgrade.

Service Maintenance and Outages: There are times when ArcGIS Server web services need to be stopped to facilitate routine maintenance (eg: data updates, server updates). Agencies choosing to publish/host EGC services should give users 48 hours notice

[12] "Substantive" changes include removing objects (feature classes, tables, rasters, relationships) and/or fields associated with these objects from a AGS service (including geocoding services). Adding objects of fields to an object DO NOT constitute a substantive change. Data edits to features or attributes DO NOT constitute a substantive change.

before stopping services for routine maintenance. Notice should be sent out on the VGIS-L listserv. The notice should include the date, time, and anticipated timeframe of the outage. Outages associated with routine maintenance should be limited to 24 hours or less. The status of any "unplanned" outages (eg: server crash) lasting more than 2 hours should be forwarded to VGIS-L.

Deploying Services with HTTPS: Agencies hosting EGC services are strongly encouraged to offer such services over HTTP and HTTPS. This allows application developers to avoid "mixed content" vulnerabilities and browser errors.

Attachment B

EGC Deployment Guidelines for ArcGIS Online

Summary: These guidelines only apply to ArcGIS Online components designed to support sharing between EGC partners (members of the EGC).

AGO Configuration: The following configuration can be used to facilitate sharing between EGC partners and the public.

- **Users** (and Associated Folders)**:** EGC partners using AGO can create the following user and associated folders to share GIS resources with the public or with other EGC members.
    - **EGC_<Agency>**: This AGO user will be used to control access to resources stored in the ./EGC_share folder hosted by other EGC member agencies. Other agencies will be able to invite this user to access their AGO resources by sharing it with the "<Agency> EGC User Group" defined below.
        - **./EGC_share:** This folder can be used to share/exchange Maps, Map Services, Layers, Tools, Apps, and Files between EGC partners. *The contents of this folder should only be shared with those in the "<Agency> EGC User Group" outlined below.*

- **User Groups:** EGC partners using AGO can create the following user group to facilitate sharing between EGC partners
    - **<Agency> EGC User Group:** This AGO user group will be used to control access to resources stored in the ./EGC_share folder outlined above. A "vt egc" tag should be assigned to this group. Once configured, agencies can invite the corresponding EGC_<agency> AGO users to join the group. For example, if ANR wants to share resources via AGO with VTrans, they would invite the EGC_VTrans user to join ANR's "ANR EGC User Group". Anything that ANR has shared with the "ANR EGC User Group" would then be available to the EGC_VTrans user (or any other EGC_<agency> users invited into the group).