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Request For Quotation

And

Call For Participation

In the

NSG PLUGWEEK PILOT (NPP)

Annex B—NSG Plugweek Pilot Concept Architecture

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Annex B: NSG Plugweek IP Pilot Architecture

1   Introduction

The NPP aims to exercise the NSG Profiles of OGC Web Services using an instance of the Topographic Feature Data Management architecture being developed in that program. This Annex is structured using the viewpoints of the Reference Model for Open Distributed Processing.

2   Enterprise Viewpoint

The enterprise viewpoint describes business perspective, purpose, scope and policies.

2.1   Objective

The goal of the NPP project is to validate NSG profiles of the selected OGC service Standards and GML application schemas.

The concept architecture and this annex contain architectural artifacts designed to describe key aspects for the NPP and highlight where open geospatial technologies and standards can be leveraged toward the greatest gain.

NGA seeks to assess the current state of implementations for the NSG Profiles and at the same time exercise the Topographic Features Data Management model through service and client demonstrations. Specifically, NGA requires assessment and evaluation of client software and services to support implementation of the NSG profiled OGC standards used in this project. This effort will use the profiles already defined by NGA.

2.2   Stakeholders

NPP stakeholders include:

- National Geospatial-Intelligence Agency

2.3   Use Cases

The Plugweek is being run as an OGC Pilot Project, but due to the nature of the sponsor requirements explained in the RFP/RFQ Paragraph 2.2 the pilot will assume that the user objectives have been taken into account in designing the NSG Profiles of OGC Web Services and the NSG GML Application Schemas. The architecture and testing is therefore focused on the services and schemas and less on use cases. The participants will work with IP Team during the kickoff to refine the plan for interactions that will be tested during the Plugweek. Those interactions will then be assembled into one or more uses case demonstrations by IP Team.

2.4   Terms of Use

The NPP will be organized around the unclassified OGC Network and access will be provided to all selected participants. Access to limited distribution data will be accomplished by granting access to clients coming from known IP addresses.

3   Information Viewpoint

3.1   Overview

The information viewpoint is concerned with the semantics of information and information processing. It defines conceptual schemas for geospatial information and methods for defining application schemas. The conceptual, or base, schemas are formal descriptions of the model of any geospatial information. Application schemas are information models for a specific information community. Applications schemas are built from the conceptual schemas. Encodings of the applications schemas are also identified in this viewpoint.

The specifics of the information viewpoint are determined by the Application Schemas provided as Government Furnished Information.

3.2   NSG Conceptual Schemas

The NPP Plugweek will exchange data that implements the NSG Feature Data Dictionary (NFDD) and an application schema provided by the sponsor.   The NSG Application Schema provides background for how the supplied schema was designed.

The NFDD[1] specifies the semantic content of the NSG through profiling, integrating, and extending concepts from multiple authoritative community-specific feature data dictionaries (DGIWG DFDD, AIXM, MIDB, IHO S-57, NATO AML, and others). These concepts characterize aspects of real-world entities (or objects) and related properties, including those that are not necessarily visible or have a tangible physical form (e.g. Airspace). The NFDD is a comprehensive dictionary and coding scheme for feature types, feature attributes (properties or characteristics associated with features), and attribute values (domain of feature attributes).

The NAS[2] specifies a Platform Independent Model that determines the syntactic structure used across the NSG to represent the geospatial semantics specified by the NSG Entity Catalog (NEC) and NSG Feature Data Dictionary (NFDD). The NAS integrates conceptual schemas from ISO 19100-series standards for entity modeling, such as those for features, events, names and coverages (e.g., grids, rasters, and TINs). The NAS specifies a single clear, complete, and internally-consistent NSG geospatial data schema that may be used to derive system-specific implementation schemas in a rigorous manner.

One of the four data content specifications of the NAS will be used in the NPP:

- Global – Not Applicable to NPP

- Regional – Not Applicable to NPP

- Local will be used: Information about the schema is found in Paragraph 3.3 below.

- Urban-Specialized – Not Applicable to PP

3.3   GML Application Schemas

GML Application Schemas (GML 3.1.1) will be provided by the sponsor. The Schemas will posted before July 21st and be added to the RFP Home Page as well. The schema will be based on OGC Simple Features Profile for GML 3.1.1.

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[1] National System for Geospatial-Intelligence (NSG) Feature Data Dictionary (NFDD), Version 1.8, May 2007
http://www.gwg.nga.mil/documents/asfe/NFDD_v1.8.pdf

[2] National System for Geospatial-Intelligence (NSG) Application Schema (NAS), Version 1.8, May 2007
http://www.gwg.nga.mil/documents/asfe/NAS_v1.8.pdf

- The LTDCS EC zipfile found at: www.opengeospatial.org/standards/ requests/58 and the Geodatabase design also found at the same URL provides guidance to the coming schema itself. The Schema will reflect these documents .

 The NPP will depart from typical testbed protocol and modify those schema only if absolutely necessary – redesign is not the goal. The goal is evaluation of the suitability of those schemas.

The profiles are available at:
http://portal.opengeospatial.org/index.php?m=projects&a=view&project_id=285&tab=2&artifact_id=33826 The profiles mostly prescribe that certain optional functions are required and the schemas essentially follow the Simple Features Application Profile found at:
http://portal.opengeospatial.org/files/?artifact_id=15201

The Application Schema will be posted to the RFQ/CFP website as an Update prior to the Bidder's Conference

3.4 Imagery

Imagery types to be supported will by encodings specified in the NSG WCS profile. The NSG WCS Profile requires the following encoding types: GeoTIFF, HDF-EOS, DTED, NITF, and GML

3.5 Service Metadata

The most basic operation an information service must provide is the ability to describe itself. The services implemented in this project shall follow the OGC standard of providing a service operation called *GetCapabilities* that offers a rich set of service-level metadata to the caller. This is described generally in the *OGC Web Services Common Specification*. Service-specific metadata is described in the specification document for the particular service being implemented.

4   Computational Viewpoint

The computational viewpoint is concerned with the functional decomposition of the system into a set of services which allow clients and servers to interact via interfaces. This viewpoint captures the details of these components and interfaces without regard to actual distribution.

4.1 NSG Profiles of OWS

NSG Plugweek will use the NSG Profiles of OGC Web Services as shown in Table 1.

The profiles are available at:
http://portal.opengeospatial.org/index.php?m=projects&a=view&project_id=285&tab=2&artifact_id=33826.

Table 1 – NSG Plugweek Interfaces and Encodings

Standard Name	Version	Encodings	Notes
Web Map Service	WMS 1.1.1		

Web Feature Service	WFS 1.1.0	GML	
Web Coverage Service	WCS 1.0		Profile lists NITF, GeoTIFF, HDF-EOS as permissible. TBD at Kickoff
Catalog Service Web	CAT 2.0.1		

4.2   Authentication & Authorization

Requirements for authorization will be satisfied by the use of IP access control.

5   Engineering Viewpoint

The Enterprise, Information, and Computation viewpoints describe a system in terms of its purposes, its content, and its functions. The Engineering viewpoint relates these to specific components types. The architecture configuration and component types provide a design for deployment as a distributed system. This viewpoint examines the specific engineering "solutions" to problems posed by applying the information and computation elements of the architecture to the requirements of the use cases. Aspects of these solutions involve choice of technology, but also involve development of specific component interactions and workflows which support the desired user interactions.

In the context of a concept plan, this viewpoint is largely schematic and outline in nature. Further details will be filled in and refined for the purposes of the RFQ/CFP and then as the result of design, implementation, experimentation, and problem-solving during the course of the pilot.

5.1   Engineering Architecture

The top-level configuration of the component types to be deployed in the NPP are shown in the figure.
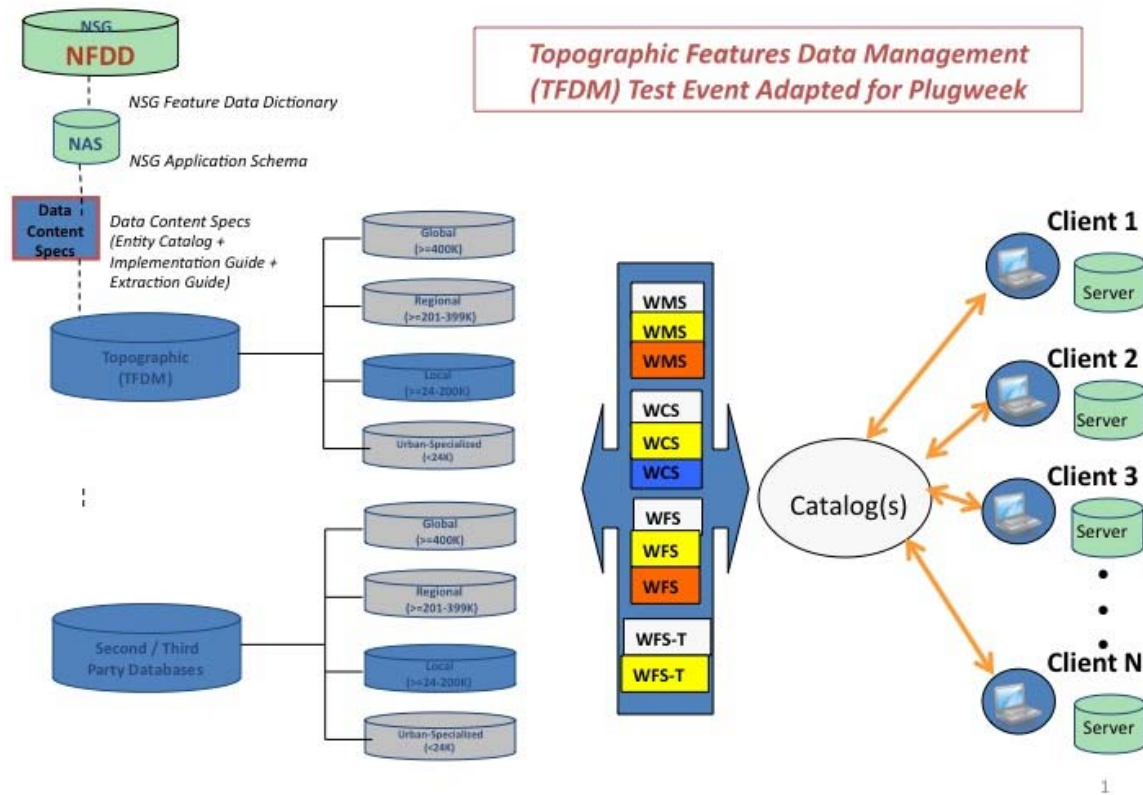
Figure 1 – NPP Engineering Architecture

5.2   Component Requirements

The characteristics of classes of component are defined here.

5.2.1   TFDM-Like Component

TFDM-shall be accessible using the NSG Profiles of WMS, WCS and WFS as listed in Table 1. The TFDM will serve data compliant with the NSG Appplication schema for Global, Regional, Local and Urban-Specialized schema types.

5.2.2   Second/Third Party Databases

Any data storage technology is acceptable so long as the output matches the provided NSG Profile and GML application schema(s).

5.2.3   Catalog

The NPP Catalogue shall contain metadata for the TFDM and Second/Third Party Databases.

Catalog shall be accessible using the NSG Profile of CSW.

5.2.4 Web Browser Client

Web browser clients will support NSG Profiles for the services they access.

Web browser client will access and display the information from the services.

A separate portal component (server-side) may be deployed to support web clients.

5.2.5 OWS Integrated Client

The OWS Integrated Client component types will support the NSG Profiles.

The purpose of an integrated client[3] is to provide a unified environment that allows a user to visualize, analyze, and/or edit data from feature, imagery, video and sensor web data sources within a single client. Within the context of the OGC, this means that the integrated client allows a user to publish, discover, access, integrate and apply all types of spatial data (e.g., raster, vector, coverages and sensor observations) from a wide range of web services through OGC standard interfaces.

The functionality of an integrated client can be divided into the following five categories:

- Service Discovery & Binding
- Feature Production
- Imagery Production/Exploitation
- Project Persistence and Sharing

6   Technology Viewpoint

The technology viewpoint is concerned with the deployed services and infrastructure of a system, describing the hardware and software components used. Instances of the component types identified in the Engineering Viewpoint are deployed in the configurations listed in the Technology Viewpoint. The specific details of this architectural view will continue to be filled out throughout the course of the pilot work, culminating in the completed pilot report at the end of the project.

6.1   Compliance Test site

Prior to testing between NPP participants, participants will be testing their components that have services

Each service shall pass standard OGC compliance testing found at: http://www.opengeospatial.org/compliance, and then also pass NSG Profile Testing found at: http://ww8.geoenterpriselab.com/teamengine/.

Compliance testing will be done with each individual service interacting with the OGC compliance test site via the open network.

6.2   Development Network

Participants will deploy component instances in advance of the plug week at a location of their organizations choosing. Interactions between the components will be accomplished using the open internet with some servers granting access to clients with known IP addresses.

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[3] Integrated Client for Multiple OGC-compliant Services, http://portal.opengeospatial.org/files/?artifact_id=1328

The NPP Engineering Architecture will be deployed in this network. The network will be used to conduct TIEs in advance of the Plugweek.

6.3 Plugweek Network

Participants will deploy component instances in advance of the plug week at locations of their organizations choosing which will include the OGC Offices in Herndon, VA. The plugweek will be conducted mainly at the OGC Herndon office. Organizations may bring hardware platforms to the OGC Herndon Office. OGC will host a Ethernet-based Local Area Network in the offices that are connected to the open internet. Interactions between the components will be accomplished using Herndon LAN and the open internet with some servers granting access to clients with known IP addresses.

The NPP Engineering Architecture will be deployed in this network. The network will be used to conduct the main tests of the NPP Initiative

Appendix C : NPP IP Architecture References

Refer to the OGC website (http://www.opengeospatial.org/specs/?page=baseline) for the authoritative listing of adopted documents.

Note: Please contact the OGC Tech Desk if you need assistance in gaining access to these documents (techdesk@opengeospatial.org).

OGC Specifications and Supporting Documents Relevant to NPP IP:

1) OpenGIS® Geography Markup Language (GML) Implementation Specification (version 3.1.1, available at: http://www.opengeospatial.org/specs/?page=specs

2) OpenGIS® Filter Encoding Implementation Specification, version 1.1.0, available at: http://www.opengeospatial.org/specs/?page=specs

3) OpenGIS® Web Map Service (WMS) Implementation Specification, version 1.1.1, available at: *http://www.opengeospatial.org/specs/?page=specs*

4) OpenGIS® Web Feature Server (WFS) Implementation Specification, version 1.1.0 available at: *http://www.opengeospatial.org/specs/?page=specs*

5) OpenGIS® Catalog Service Implementation Specification, version 2.0.1 available at: *http://www.opengeospatial.org/specs/?page=specs*

6) OpenGIS® Web Coverage Service Implementation Specification, version 1.1.0 available at: https://portal.opengeospatial.org/files/?artifact_id=18153

Other OGC Specifications and Supporting Documents

1) OpenGIS® Abstract Specification Topic 11: OpenGIS® Metadata (ISO/TC 211 DIS 19115) May 2001, <http://www.opengeospatial.org/techno/abstract/01-111.pdf>

ISO Specifications

1) ISO 19115 (Metadata) : http://www.isotc211.org/protdoc/DIS/ISO_DIS_19115_(E).pdf

2) ISO 19139 *XML Schema Implementation of ISO 19115:2003*

MIL-STD

1) MIL-STD-2500C, NITF 2.1

2) **Other Related Specifications:**

NSG Feature Data Dictionary (NFDD)

http://www.opengeospatial.org/standards/requests/58

NSG Application Schema (NAS)

http://www.opengeospatial.org/standards/requests/58