A Web 3D Service (W3DS) is a portrayal service for three-dimensional geodata, such as landscape models, city models, textured building models, vegetation objects, and street furniture. Geodata is delivered as scenes that are comprised of display elements, optimized for efficient real time rendering at high frame rates. 3D Scenes can be interactively displayed and explored by internet browsers with 3D plugins, or loaded into virtual globe applications. A W3DS is capable of handling data sets of a wide range of scales, from full globes down to smaller immobile objects such as lanterns which are still of geographic relevance. It can handle data sets consisting of multiple Levels of Detail for each object, thereby greatly increasing performance without sacrificing quality. The representation of geographic objects may range from very detailed and textured models, to prototypic and generic models used for same types of objects, to abstract boxes or symbols. Scenes are retrieved by queries defining the geographic area, information layers, styles, and further parameters, very similar to the Web Map Service (WMS) interface. The formats used for encoding 3D scenes are designed for limited bandwidth networks like the internet and realistic and efficient real time rendering. They avoid overhead produced by e.g. XML tags, and exploit graphics technologies like display lists, re-using scene graph nodes by defining links, indexed geometry arrays, and real time shaders. Due to the formats used to deliver content, the W3DS is not restricted to static objects; it can also include animations and other visual effects, as well as pre-defined behaviors.
triggered by user interactions. The role of a W3DS is similar to the role of a WMS. It does not necessarily provide the original geodata but a visual representation (view) of it. This view is called a “Scene” and consists of display elements representing the geometry, appearance, and behavior of geographic objects. It does not contain attributes and semantic information. In contrast to the WMS, the output of a W3DS is not images, but scene graphs consisting of a tree like structure of nodes, groups, transforms, shapes, materials, and geometries. Since attributes are not part of the scene graph, they must be accessed by additional service operations. The W3DS GetFeatureInfo operation is responsible for accessing additional information on objects and functions equivalent to the WMS. The W3DS can have its own data store or it can retrieve all of the required data using an implementation instance of the OGC Web Feature Service interface standard (WFS), forwarding and processing all data on request. Another possibility is to locally cache the content provided by a WFS instance and then synchronize all data in order to save network bandwidth and processing time during the handling of requests, thus reducing the response times. In the case of using a WFS instance to access an original data store, we assume that the WFS instance supports the ability to provide an OGC CityGML encoding as the response encoding payload. Otherwise, clients would not benefit from an intermediate 3D portrayal service. In such a setup, the WFS implementation(s) play the role of a central data repository, that is maintained and updated by the owner of the data. Copyright © 2010 Open Geospatial Consortium. ix OGC 09-104r1 OGC 09-104r1 The W3DS then acts as middleware enabling efficient visualization and streaming to the interactive client. The OGC Geography Markup Language (GML) standard already supports many features for describing three-dimensional objects. The GML information model is derived from the ISO 19100 series of international standards and contains elements for describing surfaces, solids, and aggregate types. CityGML adds semantic and structure to the GML schema and defines very precisely how elements of the urban environment can be modeled in a logical and interchangeable way. CityGML is defined as an application profile of GML and contains a spatial model, an appearance model, and a thematic model for various types of real world objects. In contrast to the usual 2D vector formats (e.g. SVG), CityGML can represent the geometrical properties of objects in a level of detail that is even sufficient for Virtual Reality applications. However, this specification draft was developed in order to leverage the usage of another set of standards that focus on efficient real time visualization techniques and 3D cartographic features. These include first and foremost X3D, which is a W3C standard, and KML which is an OGC standard. The advantage of using visualization centric exchange formats is on the one hand the more compact encoding allowing a higher throughput in limited bandwidth networks and on the other hand the support of sophisticated appearance, shading, behavior, and animation models. The W3DS shall support X3D as mandatory format.