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# YANG geo-location

draft-chopps-netmod-geo-location-01

# Why?

- Many applications include need for specifying geographic location
  - Datacenter
  - Router/Firewall/File Server
  - Fiber endpoints
  - Fiber cuts
  - Customers
  - Weather Stations
  - Cameras
  - ...
- Good to have common grouping that can be re-used

# Simple? Not Really.

- Lat/Long maybe Height, done?
  - Ellipsoidal (lat/long)
  - Cartesian (x, y, z)
- Location Accuracy
- Height Relative to What?
  - Mean-sea-level (MSL)
  - Geoid (approximation of MSL)
  - Local Ground

# Not Simple.

- Coordinate Reference Systems
  - Specify Geodetic Datum
  - Defines what the values mean and what they are relative to.
- Standard Systems
  - WGS84 (updated by EGM96)
- Other Standard Users
  - W3C
  - GML
  - KML
  - IETF URI

# Not Simple (cont.)

- Continental Drift
- Non-Earth Geographic Locations
  - Moon
  - Mars
  - Asteriods
- Virtual Realities
- Alternate Mappings

# Grouping

```
+-- geo-location
  +-- reference-frame
    | +-- alternate-system?    string {alternate-systems}?
    | +-- astronomical-body?  string
    | +-- geodetic-system
    |   +-- geodetic-datum?    string
    |   +-- coord-accuracy?    decimal64
    |   +-- height-accuracy?   decimal64
  +-- (location)
    | +--:(ellipsoid)
    | | +-- latitude          degrees
    | | +-- longitude         degrees
    | | +-- height?           decimal64
    | +--:(cartesian)
    |   +-- x                  decimal64
    |   +-- y                  decimal64
    |   +-- z?                 decimal64
  +-- velocity
    | +-- v-north?            decimal64
    | +-- v-east?             decimal64
    | +-- v-up?               decimal64
  +-- timestamp?              types:date-and-time
```

# Portability – IETF URI

- Defines:
  - Latitude
  - Longitude
  - Optional Height
  - Optional Uncertainty
  - Optional Coordinate Reference System (default: WGS84)
  - **No timestamp**
- Fully expressible in YANG grouping
  - Note: uses strings vs decimal64 values

# Portability – W3C

- Defines:
  - Latitude
  - Longitude
  - Optional Height
  - Optional Accuracy
  - Optional Height Accuracy
  - Optional Heading + Speed
  - **No Coordinate Reference System (uses: WGS84)**
- Fully expressible in YANG grouping
  - Note: uses doubles vs decimal64 values



# Portability – GML

- Defines:
  - Very Generic (Abstract) Coordinate Reference Systems
  - Sequence of values defined by CRS
  - We are concerned with geodetic systems for which there exists:
    - Ellipsoidal (lat/long/height)
    - Cartesian (x, y, z)
  - Unclear if srsName (CRS) values are standardized “anyURI”
  - Defines Observation that includes timestamp
    - Also includes things like target and resultOf which are not mappable
- Mostly expressible in YANG grouping for standard CRS.
  - Geo location specific data is mappable.

# Portability – KML

- Superset of W3C
- Allows different meanings for height
  - ClampToGround (ignore height)
  - RelativeToGround
  - Absolute (geoid)
  - ClampToSeaFloor (ignore height)
  - RelativeToSeaFloor
- Includes other non-geo things such as camera angle.
- Fully expressible in YANG grouping.
  - The seafloor values would need to be mapped.

# Simple Example

```
<locatable-item>  
  <name>Gaetana's</name>  
  <geo-location>  
    <latitude>40.73297</latitude>  
    <longitude>-74.007696</longitude>  
  </geo-location>  
</locatable-item>
```

# Example

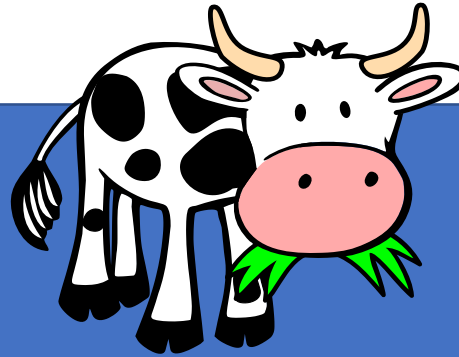
```
<locatable-item>  
  <name>Pont des Arts</name>  
  <geo-location>  
    <timestamp>2012-03-31T16:00:00Z</timestamp>  
    <latitude>48.8583424</latitude>  
    <longitude>2.3375084</longitude>  
    <height>35</height>  
  </geo-location>  
</locatable-item>
```

# Non-Earth Example

```
<locatable-item>
  <name>Apollo 11 Landing Site</name>
  <geo-location>
    <timestamp>1969-07-21T02:56:15Z</timestamp>
    <reference-frame>
      <astronomical-body>moon</astronomical-body>
      <geodetic-system>
        <geodetic-datum>me</geodetic-datum>
      </geodetic-system>
    </reference-frame>
    <latitude>0.67409</latitude>
    <longitude>23.47298</longitude>
  </geo-location>
</locatable-item>
```

# VR

0,0



1,1

```
<locatable-item>
  <name>Kent's Spotted Cow</name>
  <geo-location>
    <reference-frame>
      <alternate-system>kentspace</alternate-system>
      <geodetic-system>
        <geodetic-datum>kent-87</geodetic-datum>
      </geodetic-system>
    </reference-frame>
    <x>0.5</x>
    <y>0.5</y>
  </geo-location>
</locatable-item>
```

# Open Issues

- Height
  - Add “to ground/to geoid” and/or user defined value?
- Registry
  - FCFS, maybe Designated Expert with no-duplicate directions?
  - Use current IETF-URI?
    - Too strict for private use: "Specification Required" and "IESG Approval“?
    - Update that registry?
    - Keep new registry?
  - Use URN for registry names (prior art)?
  - Reserve a URN/Prefix to refer to existing registries
    - ESPG (International Assoc. of Oil and Gas Producers)
    - Prior art.
  - Want to avoid duplication, but provide full functionality.

# Questions and Comments

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