**Canadian Association
for Public Alerting and Notification**

**Association Canadienne
d'avis et d'alert au Public**

Title:	Event Location Layer for the Common Alerting Protocol (CAP)
Description:	Requirements specific to the inclusion of geospatial event location data within a CAP alert.
Document Manager:	Canadian Association for Public Alerting and Notification (www.CAPAN.ca)
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Purpose of this Document

The purpose of this document is to define requirements associated with representing event location data in a Common Alerting Protocol (CAP) alert, which will be used in support of a common visual presentation of the associated event on a map, as well as other purposes.

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I. Copyright

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II. Notices

We emphasize that best practices continue to evolve in this area, as does an understanding of the many challenges and opportunities associated with this effort.

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III. Revisions Summary

Corrections made to May/09 draft - removed unnecessary angle brackets from examples

IV. Normative References

I. The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in IETF RFC 2119, available at http://www.ietf.org/rfc/rfc2119.txt

II. Consistent with the Common Alerting Protocol, geographic data requirements are [WGS 84] National Geospatial Intelligence Agency, Department of Defense World Geodetic103 System 1984, http://earth-info.nga.mil/GandG/tr8350_2.html, NGA Technical 104 Report TR8350.2, January 2000.

V. Reference Documents and Resources

1. Common Alerting Protocol (CAP)

    a. The Common Alerting Protocol (CAP) is an international standard administered by the Organization for the Advancement of Structured Information Standards (OASIS) (www.oasis.org)

    b. Version 1.1 may be found at http://www.oasis-open.org/committees/download.php/15135/emergency-CAPv1.1-Corrected_DOM.pdf

2. Canadian Profile of the Common Alerting Protocol (CAP-CP)

    a. CAP-CP defines rules, recommendations and managed lists to be used in Canada with the Common Alerting Protocol.

    b. CAP-CP and supporting information are available at www.CAPAN.ca/CAP-CP

VI. GeoConnections Recognition

This project is receiving financial support from GeoConnections, a national program initiative led by Natural Resources Canada. GeoConnections and its program participants are working to enhance the Canadian Geospatial Data Infrastructure, an on-line resource that enables decision-makers to access, combine, and apply geographic information to gain new insights into social, environmental, and economic issues.

VII. Introduction

Background

The Common Alerting Protocol (CAP) includes requirements specific to the alert area, but not the actual event location or its shape. In the absence of event specific location information, recipients of CAP alerts do not have sufficient information to create a comprehensive common operational picture (COP).

Using an industrial fire as an example, the area defined using existing CAP requirements might include an entire town. This could be presented on a map as a shaded area of significant size (see image below). The actual fire, however, would ideally be presented as a single flame icon at the location of the fire. Additionally, the plume cloud might be presented using a polygon.
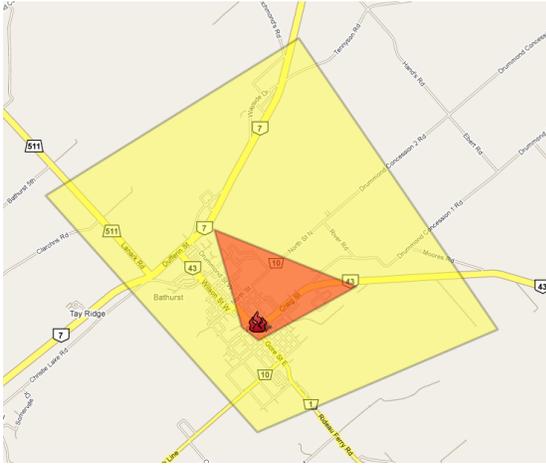
This image was created using Google Maps.

Fortunately, CAP is extensible. It allows for the inclusion of user defined data specific to the event location which can be used in support of the presentation of alert events on maps. Further, each CAP alert includes levels of urgency, severity and certainty which we might associate with presentation style policy. Ex. Alerts having very high severity might be presented in red.

Symbology

At the time of writing there was no official association between CAP-CP event codes and icons. Further, at the time of writing GeoConnections was entertaining proposals to define Canada's public safety symbology set, which is expected to be based on symbology efforts of the US Federal Geographic Data Committee.

CAPAN's Role

In the fall of 2008, CAPAN began making the case for defining technical requirements in support of the geospatial presentation of CAP-CP alerts. In turn, GeoConnections invited CAPAN to make application for funding, which CAPAN did, and GeoConnections approved in February 2009. CAPAN hosted the first CAPAN CAP-CP Geospatial Presentation meeting February 24 2009.

CAPAN CAP-CP Geospatial Presentation Project Team

CAPAN's project team included the following persons:

- April Diver, Province of Alberta Emergency Management
- Doug Allport, Allport Group / CAPAN
- Gordon Plunkett, ESRI Canada
- Jacob Potter, InfoNaut

- Jacob Westfall, Net Alerts
- Khalil Hayek, Natural Resources Canada
- Lisa Munn, Province of New Brunswick Emergency Measures
- Lori Mofford, Province of New Brunswick Emergency Services
- Mark MacKenzie, CARIS
- Murray Sanders, Province of Saskatchewan Emergency Measures
- Nail Wallace, InfoNaut
- Norm Paulsen, Environment Canada
- Pierre Bilodeau, ESRI Canada
- Ryna Brideau-Thombs, Telus Geomatics
- Steve McCourt, Natural Resources Canada
- Yves Leger, City of Saint John Geomatics

Key Objectives

The project team worked with the following objectives:

1. Define a common operational picture across geographic presentation platforms.

2. Impose as few additional requirements as possible on the issuer of an alert.

3. Recognize and support related projects. Ex. GeoConnections public safety symbology efforts.

4. Provide backwards compatibility of future requirements.

5. Create requirements specific to CAP, rather than CAP-CP, if possible.

CAP or CAP-CP Association

The project team concluded early in the project that style need not be defined by the issuer of a CAP-CP message, because style could be associated with CAP-CP defined events, in combination with CAP values for severity, urgency and certainty. Since CAP does not include a managed list of event references like CAP-CP does, the requirements defined herein were to be associated with CAP-CP.

The team has since recognized that all which is required of an alert issuer is the event location and its shape. Ex. Point, line, circle and or polygon. With that in mind, the team recognized the potential of other uses for the data, and decided to identify the requirements for event location, rather than make them specific to CAP-CP geospatial presentation. This approach, the team believes, aligns well with CAP objectives, and perhaps the adoption of the requirements within a future version of the CAP standard. We note that at the time of writing, presentation of alerts was considered to be out of scope of CAP.

Feeds

We can expect CAP-CP content to be distributed using GeoRSS with Really Simple Syndication (RSS) and Atom, using Simple, Geographic (GML) and Keyhole Mark-up Languages (KML). The project team behind this effort is working towards requirements specific to each, which are to be presented under separate cover.

In addition, CAPAN is supporting a presentation feature found in some feed readers. Rather than present all feed items using default push pins, or other symbols, some feed readers are capable of downloading symbols from a URI included in the feed, and presenting them at the point identified for such presentation in the feed item. CAPAN has created a URI for each CAP-CP event code, where a symbol is stored for download. This new service was recently demonstrated in the New Brunswick Multi-Agency Situational Awareness System.

Presentation Style Policy

As noted earlier, presentation style policy can be associated with combinations of CAP-CP events, and CAP ratings of urgency, severity and certainty. We expect much of this policy will be defined during the GeoConnections sponsored public safety symbology project mentioned above. In the meantime, the team supporting this effort is developing technical requirements mindful of presentation policy considerations, including those which would support persons who are colour blind, and black and white printing. Ex. Symbol border styles, rather than or in addition to colour, associated with the CAP severity value.

Other Project Considerations

The team plans to revisit the following issues which have been white boarded for further discussion.

1. Impact of time on the event location and shape. Ex. Storm moving east at 10 KPH.

2. Handling of an event where the event location and area of alert are the same.

3. Versioning of this layer. At the time of writing, backwards compatibility is anticipated.

Reference Material

A thorough understanding of CAP, CAP-CP, GeoRSS, Atom and KML will be useful to anyone reading this document, and engineering to it.

VIII. Version 1.0

Version I requirements defined in this document support the following:

1. CAP alert issuer identification of a point where the event is occurring. Ex. Industrial fire.

2. CAP alert issuer identification of a line string which defines the event. Ex. Road segment closed.

3. CAP alert issuer identification of a polygon where the event is occurring. Ex. Wildfire perimeter.

4. CAP alert issuer identification of a circle where the event is occurring. Ex. Contamination area.

The need for versioning within these CAP layer elements is not anticipated, and therefore not included in the values defined herein. However, should significant changes occur in the future, the need to revisit this versioning decision may be required.

IX. CAP Elements Affected

The requirements defined herein are specific to the CAP element known as <parameter>.

We note that each CAP <info> block may have <parameter> values associated with it, and that each CAP <info> block may therefore support presentation independently of other <info> blocks.

Consistent with the CAP-CP approach to alert areas being defined within associated English and French <info> blocks, event location areas should be defined in the same way within associated English and French <info> blocks.

X. Requirements

CAP <parameter><valueName>

The <parameter><valueName> format for this layer follows the guidance offered by CAP-CP. It identifies the <parameter> to be layer, the organization managing the layer, and a descriptor of the layer. This layer will include "layer:CAPAN:eventLocation".

Presentation Options

The presentation option will be included in the layer <valueName> as the final element.

For point, the <parameter><valueName> is as follows:

layer:CAPAN:eventLocation:point

For lines and polylines, the <parameter><valueName> is as follows:

layer:CAPAN:eventLocation:line

For polygons, the <parameter><valueName> is as follows:

layer:CAPAN:eventLocation:polygon

For circle, the <parameter><valueName> is as follows:

layer:CAPAN:eventLocation:circle

CAP <parameter><valueName><value>

The latitude longitude coordinate values (in decimal notation) for the presentation layer follow the <valueName> as the associated <value>. As noted above, and consistent with CAP, the geographic polygon is represented by a whitespace-delimited list of **[WGS 84]** coordinate pairs. Circle area is represented by a central point given as a **[WGS- 84]** coordinates pair followed by a space character and a radius value in kilometres.

These requirements recommend six decimal points for latitude and longitude values. However, fewer or greater decimal points are allowed for.

Consistent with CAP practices, a polygon is to include a closing pair of lat/long values which are the same as the initial pair of lat/long values.

Examples:

```
<parameter>
        <valueName>layer:CAPAN:eventLocation:point</valueName>
                <value>45.245678,-75.434567</value>
</parameter>


<parameter>
        <valueName>layer:CAPAN: eventLocation:line</valueName>
                <value>45.245678,-75.434567 45.193467,-75.689043
                44.906549,-75.323689</value>
</parameter>

<parameter>
        <valueName>layer:CAPAN:eventLocation:polygon</valueName>
                <value>44.919353,-76.295074 44.880444,-76.245972
                44.897350,-76.190186 44.945240,-76.236359 44.919353,-
                76.295074</value>
</parameter>

<parameter>
        <valueName>layer:CAPAN:eventLocation:circle</valueName>
                <value>45.245678,-75.434567 4.3</value>
</parameter>
```

Items per <info> block

There are no implied restrictions with respect to the number of event location points, lines or polygons an issuer may include in each <info> block.

The authors suggest convertors of CAP-CP to feed items generate a single feed item for each layer point, line, polygon or circle value.

XI. CAP Example

Overturned Chemical Truck

In this example, a truck has overturned at the intersection of two highways. It is leaking a hazardous gas, and an area of concern is identified. Sections of two highways are being closed.

Two alerts are issued related to the incident. One is for the hazardous material spill and the other for road closures. Combined, the two alerts result in the following geospatial presentation.

 Hazmat Spill

 Road Closure

 Alert Area

 Hazard Area

This image was created using Google Maps.

The CAP hazardous material alert includes event location information specific to the point where the incident occurred, and the hazard area. Please note that the alert area is defined in the CAP <area> block using standard CAP elements (not presented here).

```
<alert>
…
    <info>
        …
        <parameter>
                <valueName>layer:CAPAN:eventLocation:point</valueName>
                <value>44.789635,-76.695213</value>
        </parameter>
        <parameter>
                <valueName>layer:CAPAN:eventLocation:polygon</valueName>
                <value>44.776962,-76.692467 44.799866,-76.688004 44.799866,-76.700363
                44.779884,-76.710663 44.776962,-76.692467</value>
        </parameter>
        …
    </info>
</alert>
```

The road closure alert includes the following event location information, which defines the two road segments that have been closed:

```
<alert>
…
    <info>
        …
        <parameter>
                <valueName>layer:CAPAN:eventLocation:line</valueName>
                <value>44.797306,-76.682678 44.795235,-76.690926 44.794689,-76.698990
                44.792252,-76.703110 44.787743,-76.706970 44.786160,-76.712807</value>
        </parameter>
        <parameter>
                <valueName>layer:CAPAN:eventLocation:line</valueName>
                <value>44.795055,-76.694267 44.801937,-76.697876 44.805042,-76.701218
                44.808208,-76.707230</value>
        </parameter>
        …
    </info>
</alert>
```