Environment Canada and the Common Alerting Protocol (CAP) (Information Sheet)

5 – Environment Canada Layer

Title:	Environment Canada and the Common Alerting Protocol (CAP) 5 - Environment Canada Layer
Description:	A description of the locally defined additional elements provided by Environment Canada in our implementation of the Common Alerting Protocol using the Canadian Profile (CAP-CP)
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Reference:	http://cap-cp.ca Refer additionally to the following information sheets: *1 - General overview* *3 - Status of CAP Alerts by event as issued by Environment Canada* *7 - Environment Canada Canadian Location Codes (CLC) and the CAP-CP Location Codes(not written)* *10 - Emergency Broadcast Alerts (not written)*

Purpose of this Document

This document provides a description of the extra alerting information Environment Canada places into our CAP messages and the CAP elements employed for this purpose. This extra information is not needed for last mile distributors to create basic presentations of the alert information, but it can be useful for those that want to create more involved and elaborate displays. The added elements can also be used as filters and triggers in more advanced processing tasks. An explanation behind the content and possible uses of these elements is also given.

What is a layer?

In CAP, a layer is a term used in Canada to describe supplemental message information that a business wants to add to the otherwise standard message information normally contained within a CAP file. This extra information can be placed into one or more CAP elements that are designed for this purpose. Any agency or organization can have a layer and more than one layer can appear in any CAP file. Furthermore, this extra information within a CAP-CP file can be explicitly attributed [1] to the business responsible for generating the layer information in the first place.

At a minimum however, for a business to add extra information to a CAP file, they will need to… 1) properly place the information in the CAP message using the elements as defined by the CAP standard for this purpose and 2) put that information into proper context. Basically for number 2, the information needs to be identified for what it is. Fortunately, as mentioned, there are CAP elements specifically designed for this task and these elements fully address both points as described above. For maximum effect however, the full context of the extra information should be documented and published so that users wishing to exploit this extra information can get the most out of it. A complete listing of all the extra information attributed to a particular business is what is known as a layer. This information sheet explains the complete Environment Canada layer.

What CAP elements are used in a layer?

In CAP, the following elements are eligible for use in adding supplemental information…<parameter>, <eventCode>, and <geocode>. In CAP, they are all categorized to the optional elements category meaning that a CAP message does not have to contain any one of these elements to be considered a proper CAP message. If they do exist in a message, the data values assigned to the elements are defined by the business or community that owns the information that goes into the elements.

Additionally, these elements have other characteristics that allow them to realize their full potential as so called “layer” elements. Firstly, they can be re-used over an over again in a single CAP message. By this we mean that they can appear as many times as needed to complete the task of laying out all the extra information a business may want to impart in as many pieces as needed. This allows for the data

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[1] [1] Environment Canada recognizes this attribution component to be a choice of practices - but one we strongly support noting that the CAP Canadian Profile strongly encourages this as well.

to be broken down to the most basic of levels so that it may be used by the widest range of recipients as possible.

Secondly, these elements are elements formatted in two parts. Most CAP elements are single part elements and are named directly for what the CAP standard defines them to be (ie… <urgency>, <senderName>, etc…). However, in the two part elements, the first part is a place provided to assign a name to the particular use of that instance of the element. The name is set on the fly but would match a name given in the supporting layer documentation if an issuer expects the element to be used properly.

It is also in this naming exercise where the context is supplied (see below). Since these elements can be re-used over and over again, the provided name does not have to be the same in each use of the element thus allowing for any amount of supplemental information to be added to the file. In the second part of the element, the actual value assigned is the actual piece of data (content) to go with the name.

The CAP Standard does not make any judgment on the values used for these elements and purposely allows for businesses to define both the context and content of these elements. Clearly however, the CAP Standard does constrain the <geocode> and <eventCode> elements to a specific meaning, but these meanings are generic and the interpretation is left up to the issuer or community to define. The <parameter> is wide open in that the meaning can be defined to anything.

In CAP-CP, there is already one new definition supplied for the <eventCode> and <geocode> elements and the Canadian Profile has made these elements required in CAP-CP files. These additions and definitions are intended to serve the Canadian Public Alerting community as a whole however there is no restriction on re-using these CAP elements (with other names) in other applications. The one CAP-CP definition was created so that recipients of CAP-CP messages could rely on the presence of at least one standard pre-defined event and location reference scheme for common use. To be a valid CAP-CP message, these layer elements attributed to the profile must be present [2].

Use of layers

Aside from CAP-CP messages having at least one layer (that being the CAP-CP layer) a single CAP message does not really need to have any layers at all.

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[2] In the forthcoming CAP-CP 1.0 effort, the requirement that the CAP-CP geocode be present for the CAP message to be CAP-CP conformant has been dropped. It will read that as long as there is a GIS construct such as a <polygon> present, the CAP-CP geocode in not required. However, the Broadcast Community still does have the requirement for the use of the CAP-CP geocode so the EC CAP message files will still contain them.

Interoperability between systems and countries is served by CAP itself and doesn't need to rely on layers. A basic message display can and should be constructible from all the non-layer elements. Furthermore, there should be no expectation that any last mile distributor will ultimately use the extra layer information provided in a CAP message, however, it is hoped that the Alerting community in Canada will at least use the additional CAP-CP layer information to allow for a more consistent look and feel to Canadian alert messages [3]

At present, Environment Canada CAP messages contain more than one layer. Multiple layers in a CAP message are easily done given the design of the elements involved. The layers we include are…the CAP-CP layer as we are part of the CAP-CP community; the Environment Canada layer (see below for more details); and the SOREM layer (on behalf of the Federal-Provincial-Territorial working group that oversees the identification of critical alerts). By agreement, Environment Canada populates our CAP messages with the SOREM layer when we generate our CAP messages.

This leads to the question of overuse of layer elements - and it is a valid question. If the layer elements are given a position of prominence within a CAP file, especially at the expense of standard CAP elements, the CAP benefit of promoting interoperability between systems and countries can be negatively affected. Layer elements shouldn't be relied upon to solve everything, just solve the pieces that are missing [4]

An additional consideration is the possibility of naming conflicts across layers. Simple names within these two part elements are at risk of conflicting with each other when multiple layers are present. A practice that Environment Canada uses is to avoid simple names. We do this by employing a URN (Uniform Resource Name) styled naming convention[5] that virtually ensures no naming conflicts while simultaneously, providing the additional benefit of addressing different versions (see the section on **Versioning** at the end of this sheet for more details).

It is also possible that layer elements will migrate into the CAP standard as new versions of CAP arrive. If a commonly used layer becomes a must for the majority

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[3] In order for any recipient (including other systems and countries) to benefit from extra layer information, it serves EC well to use the provided CAP elements for this purpose and properly define and publish the proper layer context.

[4] Environment Canada is a strong proponent of using CAP elements in favor of layer elements where possible. If a piece of information can be represented properly in an existing CAP element then it should. A layer element can be defined and be used but should not replace any existing CAP element.

[5] Should OASIS and the CAP standard (or the parent EDXL family of standards) establish a standard naming format for layer elements, it is expected that Environment Canada will evolve to this new convention. For now we are content that our layer names will be unique.

of users, new elements in CAP could be created for this broad use. In such cases we believe it to be good practice to use the new CAP elements as soon as possible and eventually retire the layer elements through a version replacement process.

Establishing layers in a CAP file

A layer may involve more than just new pieces of information; it may also come with some additional processing rules - all of which is left up to the layer owner to define. Nevertheless, to let the CAP message recipient know that a CAP file may contain additional layer information, a declaration can, but is not required, to be made near the top of a CAP file to help in validating the file. This is what the <code> element in CAP is used for. It essentially is an identifying marker to help receiving systems know what extra processing can be enabled on the file (ie… additional coding instructions or value interpretations)

The following CAP-CP marker lets recipients know that the CAP Canadian Profile is in play within this file.

<code>profile:CAP-CP:0.4</code>

In this case it is version 0.4 of the profile. Since the <code> element is one of those re-useable elements, additional <code> elements can be added to let recipients know that the Environment Canada layer is also in play. We do so with the following line in the file.

<code>layer:EC-MSC-SMC:1.0</code>
<code>layer:EC-MSC-SMC:1.1</code>

In this case it is version 1.0 and 1.1 of the Environment Canada layer and as previously mentioned, we also add the SOREM and NAADs layer so we declare those one too with the following lines in the file.

<code>layer:SOREM:1.0</code>
<code>layer:NAADS:1.0</code>

All of these declarations are useful if a recipient wants to validate the content of the CAP message against the published information on those layers.

In Canada, with CAP-CP, the general practice is to identify the Canadian profile in the <code> element however not everyone in the community identifies the layers in the <code> element. We recognize this to be a choice of practices; however Environment Canada does declare all the layers we include in our CAP messages and while doing it, we identify the business and the version. For Environment

Canada to even consider including a layer on behalf of another business, we will require the above practices and policies to be in place with this other business.

Environment Canada asserts that our efforts to populate our CAP message with layer information from another business is done as a best effort and that the rules and content behind those layers is theirs alone. Implementing newer versions of those other layers is a negotiated activity subject to agreement and will likely not occur immediately.

What is in the Environment Canada layer?

The Environment Canada layer includes additionally defined uses for the <parameter> and <geocode> elements within a CAP file. In doing so, we believe we give our users additional flexibility with which to choose how they may want to act on our messages and/or present our *warning* message information.

In an effort to provide some continuity with established partners, Environment Canada has chosen to provide some *warning* message information we normally create as a matter of course, but which is not normally found in a basic CAP or CAP-CP message. We also do this in a fashion that may help long established partner systems more easily make the transition to CAP. In addition to this, we also provide some tracking information; our own location codes; and our own marker for the more urgent and critical alerts (details below).

Note: future Environment Canada layer elements could appear over time and when they do this information sheet will be updated.

Additional <parameter> elements in the Environment Canada layers

Our layers contain seven elements that we use the CAP <parameter> element when we add this extra information to an EC CAP file.

- Alert_Type (v1.0)
- Broadcast_Intrusive (v1.0)
- Parent_URI (v1.1)
- CAP_count (v1.1)
- Alert_Location_Status (v1.0)
- Alert_Name (v1.0)
- Alert_Coverage (v1.0)
- Designation Code (v1.1)

These parameters all follow the same formatting to identify them back to Environment Canada and while doing so identify them to version 1.0 or 1.1 of our defined layers. Our business name, as a component of the <valueName>, is abbreviated for use in our CAP messages and is…

EC-MSC-SMC

In full it expands to…

Environment Canada - Meteorological Service of Canada - Service Météorologique du Canada

or…

Environnement Canada - Meteorological Service of Canada - Service Météorologique du Canada

The table below explains each layer element and we list here the full <valueName> as it appears in the CAP <parameter> element.

1. `layer:EC-MSC-SMC:1.0:Alert_Type`

This <parameter> is used to categorize different *warnings* that are received from the various weather forecast offices where the *warnings* actually originate. (See information sheet *1 - General overview* for a description of *warnings*.) In our CAP, this <parameter> can have four distinct values: “warning”, “watch”, “advisory” and “statement”.

```
<parameter>
<valueName>layer:EC-MSC-SMC:1.0:Alert_Type</valueName>
<value>warning</value>
</parameter>
```

By including the “Alert_Type” as an individual element, recipients can action an automated response based on this value alone without having to extract it from a larger value in the <description> or <headline> elements. Alert type terms are commonly used terms in Environment Canada’s business of alerting and these terms have a long history.

Established users of Environment Canada *warnings* may have reason to have differing responses based on the value found in this parameter. For example, some may be interested in responding to “warnings” but not “watches” or “advisories”.

And while it is understood that they could action different responses based on the values of <urgency>, <severity> and <certainty> (or any other values in CAP), we include alert type in all our CAP messages since this classification of our *warnings* still exists in our business of *warnings*.

2. `layer:EC-MSC-SMC:1.0:Broadcast_Intrusive`

This <parameter> indicates whether or not the information contained within the block of information (<info> block) is “Broadcast_Intrusive” or not. Not to be confused with the SOREM layer element of the similar name “Broadcast_Immediately”, this parameter is Environment Canada’s own critical alert information marker. Essentially, if this parameter setting is set to yes, then the associated information should be intrusively disseminated. This would be done along the pre-determined dissemination channels and conduits that Environment Canada operates. Very few alerts overall will have <info> blocks which qualify for the “yes” setting however for such <info> blocks, where there is a reference to a hazard posing an immediate threat to life, the information is to be pushed out without an option on the receiving end to opt out. The large majority of EC alert message information will not be marked as “Broadcast_Intrusive”.

```
<parameter>
<valueName>layer:EC-MSC-SMC:1.0:Broadcast_Intrusive</valueName>
<value>yes</value>
</parameter>
```

For more information, see information sheet 10 - *Emergency Broadcast Alerts.*

3. `layer:EC-MSC-SMC:1.1:Parent_URI`

This is an internal tracking parameter that can be used to investigate specific EC CAP messages. Within EC, the CAP message is generated only after all the *warning* information has been acquired and organized within our data management system. That data is stored at a database location referenced by a URI (Universal Resource Indicator). If an EC CAP Alert message is found to have problems, we can immediately search the database for the source information as we have a reference to its location. And since we may not be the ones to discover an issue worth investigating, such as when a recipient of a CAP message reports an issue to us, we can use the Parent_URI value contained within the CAP file to begin diagnosing the cause. If a recipient reports an issue, and in order to accelerate the diagnosis, we ask that the CAP message in question is attached to the inquiry so that we can interrogate the database for the data found at the “Parent_URI”.

With the latest release of the CAP system in EC, the URI structure has changed thereby making version 1.0 of this parameter obsolete and version 1.1 now standard.

```
<parameter>
<valueName>layer:EC-MSC-SMC:1.1:Parent_URI</valueName>
<value>msc/alert/environment/hazard/alert-3.0-ascii/consolidated-xml-
2.0/20160617160603974/WW_16_76_CWWG/WSW/160603975166254144820160617050l_WW
_16_76_CWWG/actual/en_proper_complete_c-fr_not_present_u/NinJo </value>
</parameter>
```

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4. `layer:EC-MSC-SMC:1.1:CAP_count`

This parameter simply keeps a value that reports the total number of alerts, the total number of messages, and the total number of CAP-CP messages that have been issued by EC to date in the current year. The values reset on January 1st each year.

Of all the alerts that pass through the EC system for generating CAP, the data sets that make this happen are counted and the resulting output CAP messages that are generated are also counted. As one can see in the example, every Alert can have 1 or more messages and every message can have one or more CAP files. As an example, the “minorChange” CAP-CP parameter would be the reason why the CAP message count is higher than the alert message count in our system. But since not all messages result in two CAP messages (although most do), the CAP count is not necessarily double that of the Message count.

Since we do not yet issue CAP messages for all of our *warnings*, just a subset, comparing the values from year to year will not be meaningful. Since we plan to convert more EC warnings into the CAP format over time the number at each year’s end will likely by larger than the previous year (see information sheet *3 – Status of CAP Alerts by event as issued by Environment Canada)*

With the latest release of the CAP system in EC, the CAP_count structure has changed thereby making version 1.0 of this parameter obsolete and version 1.1 now standard.

```
<parameter>
<valueName>layer:EC-MSC-SMC:1.1:CAP_count</valueName>
<value>A:1762 M:2886 C:3558</value>
</parameter>
```

---

5. `layer:EC-MSC-SMC:1.0:Alert_Location_Status`

This <parameter> is used to define the activity status of the locations listed in the <info> block in the CAP file that this <parameter> element is contained within. In our CAP, this <parameter> can have three distinct values: “active”, “ended”, and “replaced”. By including the “Alert_Location_Status” as an individual element, recipients will be able to use this value without having to interpret it based on a comparison with a previous message.

The values used have the following meaning…

‘active’ – the locations listed are still active in the threat area of the hazard indicated.

‘ended’ – the locations listed are no longer active in the threat area of the hazard indicated.

‘transitioned_out’ – the locations listed are no longer active in the threat area of the hazard indicated but, they are now active in the threat area of another hazard that is related in some way to the current hazard. For example, if a specific location with a storm is expected to be subject to a new hazard where it’s one or the other hazard (i.e. rainfall or snowfall), then this <parameter> value will inform the distributer that the location in question has moved from the hazard referenced in this CAP message to a hazard that is referenced in a different CAP message. The other CAP message would also list this location but it would do so within an <info> block where this <parameter> would have a value of ’active’.

Note: the effort to make this work in version 1.1 was not meant to change the value of “replaced” (as found in v1.0) to “transitioned_out” as indicated here. If properly versioned, it would indicate version 1.1. But since the software is not able to be modified again until this situation has been in place for a few months, the error is noted here and it is hoped the uptake of this parameter is not large enough that this would be an issue to anyone yet.

```
<parameter>
<valueName>layer:EC-MSC-SMC:1.0:Alert_Location_Status</valueName>
<value>active</value>
</parameter>
```

---

6. `layer:EC-MSC-SMC:1.0:Alert_Name`

This <parameter> is used to display the French and English name of the alert issued in the CAP file. In our CAP, this <parameter> will have a French value in French <info> blocks and an English value in the English <info> blocks. By including the “Alert_Name” as an individual element, recipients will be able to

access this value without having to use a lookup table locally (that possibly would require updating over time), or without having to parse it out of the <headline> value. In the future, no coordination activities with the recipients of an Environment Canada CAP message will be required if this information changes because it will now be explicit in every CAP message we generate.

```
<parameter>
<valueName>layer:EC-MSC-SMC:1.0:Alert_Name</valueName>
<value>rainfall warning</value>
</parameter>
```

---

7. `layer:EC-MSC-SMC:1.0:Alert_Coverage`

This <parameter> is used to display the French and English name of the Coverage area of the alert issued in the CAP file. In our CAP, this <parameter> will have a French value in French <info> blocks and an English value in the English <info> blocks.

A ‘coverage’ specifies the extent of the areal coverage of the Alert for which the rules of that Alert apply. For example, if a single hazard will be impacting our clients in two neighboring Provinces but the rules for each province are different with regard to how we construct our Alert, we actually construct two Alerts - one for each Province. In such a case, there would be two CAP messages at the given time and each CAP message would have its ‘coverage’ identified and its list of threat locations identified and there would be no overlap in the areal coverage of the locations.

Coverages are defined by the Environment Canada Program that has jurisdiction over the issuance of warnings for the hazard in question. In CAP, these coverages are then repeated as defined by those programs. NOTE: Separate CAP messages for different hazards within the same coverage can exist at the same time

By including the “Alert_Coverage” as an individual element, recipients will be able to use this value without having to use a lookup table locally. In the future, no coordination activities with the recipients of an Environment Canada CAP message will be required if this information changes because it will now be explicit in every CAP message we generate.

```
<parameter>
```

```
<valueName>layer:EC-MSC-SMC:1.0:Alert_Coverage</valueName>
<value>Nova Scotia</value>
</parameter>
```

---

8. `layer:EC-MSC-SMC:1.1:Designation_Code`

This <parameter> is used to help recipients of EC CAP, group the CAP alert messages from Environment Canada into common rule sets. For example, as many as 27 different named alerts with in EC's public program are consolidated into one designation. By policy, these 27 named alerts will always have the same Alert Coverage name as each other. Other attributes of the group are also maintained within EC's own system but since a few clients use this value to mark the groupings, the value has been added to the CAP parameter set in version 1.1.

Note also that the value can also be found in the Parent URI value but since the Parent URI value is not reliable as a value for parsing (as change happens), we have purposely given Designation its own parameter to avoid dealing with changes to the Parent URI over time.

```
<parameter>
<valueName>layer:EC-MSC-SMC:1.1:Designation_Code </valueName>
<value>WW_16_76_CWWG</value>
</parameter>
```

Additional <geocode> elements in the Environment Canada layer

Like the CAP-CP managed list of location references, Environment Canada also has our own set of geo-encoded location references. These EC locations are in fact our own "business of Alerting" location references. We use them to reference locations in all our *warnings* that we currently send out to the public, the media and other emergency responders. These have been long established in our current alerting model and there are no plans to change them.

Each EC location has its own pre-defined boundary, similar in style, but different in layout, to the boundaries used in the CAP-CP locations. We call the codes that we use for these locations EC's Canadian Location Codes (CLC's). As part of the EC layer, we include references to these EC locations in all our CAP messages. As a member of the CAP-CP community, we also include references to the standard CAP-CP location layer too. Users of our CAP can choose to use either or both geocode sets - both are acceptable. To help decide, see information sheet *7 - Environment Canada Canadian Location Codes (CLC) and the CAP-CP Location Codes* for more information on how the two geocodes schemes align.

Below is an example of a CLC geocode entry in an EC CAP message.

```
<geocode>
   <valueName>layer:EC-MSC-SMC:1.0:CLC</valueName>
   <value>054221</value>
</geocode>
```

In this case it is version 1.0 of the Environment Canada <geocode> element. Polygons associated with the EC CLC codes are available from Environment Canada.