CAP-RSMCTK Profile: Description of Experimental Common Alerting Protocol (CAP) Version of Tropical Cyclone Advisory by RSMC Tokyo-Typhoon Centre

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This document describes the experimental Common Alerting Protocol (CAP) version of tropical cyclone advisory made by RSMC (Regional Specialized Meteorological Centre) Tokyo-Typhoon Centre. Comments are welcomed to refine this specification.

1. Introduction

The Common Alerting Protocol (CAP)[2] is a versatile standard to disseminate alerting messages in XML. World Meteorological Organization (WMO) has adopted CAP as a format for alerting information in the WMO Information System (WIS). The RSMC (Regional Specialized Meteorological Centre) Tokyo-Typhoon started to create experimental CAP version of its tropical cyclone advisory (hereafter TC advisory), currently sent as plain text bulletins WTPQ20-25 RJTD on the GTS.

The CAP standard is so flexible. In other words, it is necessary to create 'profile', i.e. set of various kinds of use-specific conventions on details and optional elements. This document gives a profile to CAP (hereafter called CAP-RSMCTK) used in the RSMC Tokyo's CAP version of TC advisory, in addition to related operational information to use the data flow.

Please note that this specification is really experimental state. Any comments and thoughts are welcomed to refine it to be best understood in the Typhoon operation community and best utilized in emerging public weather service activities.

> **Disclaimer**: This experimental CAP Atom feed (URL shown in Section 3.1) is provided for convenience of development of CAP profile among Typhoon Committee members, and is not intended for operational use. Japan Meteorological Agency (JMA) does not guarantee its availability. That means it may not be able to respond to queries in timely manner. For operational use, please continue to use GTS bulletins WTPQ20-25.

2. Working Cycle of TC advisory

When RSMC Tokyo recognizes a relevant tropical cyclone, it issues several types of products. Please refer to TCP-23[3] for complete listing. The TC advisory (WTPQ20-25 RJTD), for which the experimental CAP version is provided, is one of such products.

The TC advisory consists of analysis and forecast. All information has two time properties: analysis time (the time of observation the advisory is based upon) and valid time (the time about which the forecast is describing). Please don't be confused when handling updates: Figure 1 illustrates the relationship between analysis time and valid time.

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[1] Contact: toyoda@npd.kishou.go.jp

[2] The Common Alerting Protocol is developed as OASIS Standard, and the latest version is 1.2 **http://docs.oasis-open.org/emergency/cap/v1.2/CAP-v1.2.html**. The previous version 1.1 was also approved as ITU-T Recommendation X. 1303 (09/2007).

[3] TCP-23: The Typhoon Committee Operational Manual, Meteorological Component. Available at **http://www.wmo.int/pages/prog/www/tcp/operational-plans.html**.

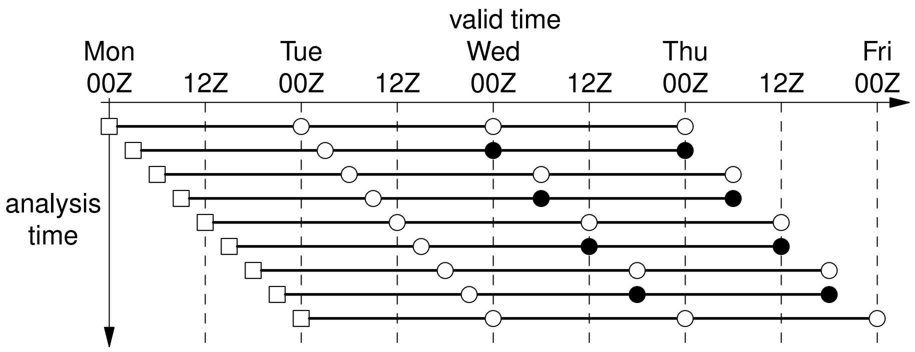

Figure 1: illustration of update cycle of TC advisory. Open (white) square indicates analysis. Open (white) circle indicates forecast (24, 48, or 72 hours). Filled (black) circle indicates information duplicated from previous issue (forecast of 45 or 69 hours). The squares/circles connected by a horizontal thick line represent a bulletin disseminated every three hours. In CAP version each circle is given as a single <cap:**info**> block.

Analysis is observation-based description of state of cyclone, updated every three hours. Forecast is made for 24, 48, and 72 hours after analysis[4]. The 24-hour forecast is updated every three hours. But forecasts for longer time (i.e. 48 and 72 hours) are updated only on six-hours interval (on 00, 06, 12, 18 UTC). On intermediate hours (i.e. 03, 09, 15, 21 UTC) the same content as previous bulletin is given as 45 and 69 hours forecast.

3. Data Structure

3.1. Structure of Atom feed

At the time of writing[5], the experimental CAP messages are served in an Atom feed (sometimes called as RSS). Recipient centres can retrieve updates by polling (periodically accessing) the feed at **http://www.data.jma.go.jp/fcd/yoho/cap-rsmctk/atom.xml**. Ten-minute interval is suggested for timely retrieval, since the feed is updated on twenty-minute cycle.

The file ‘atom.xml’ is in the Atom Syndication Format[6] containing recently-updated messages (Figure 2). A <**feed**> contains variable number of <**entry**> elements. Each <**entry**> contains a single CAP message (the <cap:**alert**> element in <**content**> element), to be described in following section.

Since the CAP messages are embedded in the Atom feed, all information you need is retrieved at once by single HTTP GET request. There is no need to retrieve individual CAP messages separately. Thus the identifier of each entry or CAP message is UUID[7] (32 hexadecimal digits beginning with **urn:uuid:**) rather than HTTP URL.

Frequent polling causes repeated downloading of the same data. If the bandwidth matters, it is suggested to use ‘**If-Modified-Since:**’ request header of HTTP[8] to suppress unnecessary data transfer.

For convenience, the Atom elements <**title**> and <**summary**> contain the minimum information of the CAP messages. Thus generic software that only understands the Atom structure (such as web

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[4] This difference (valid time minus analysis time) is called forecast time.

[5] CAP is just a format of XML, and can be used with other transfer protocols or networks. Currently RSMC Tokyo is using Atom feed on Internet considering its experimental nature, especially ease of development work and communication with various interested parties.

[6] M. Nottingham, Ed. and R. Sayre, Ed., 2005: The Atom Syndication Format. RFC 4287. **http://tools.ietf.org/html/rfc4287**.

[7] P. Leach *et al.*, 2005: A Universally Unique IDentifier (UUID) URN Namespace. RFC 4122. **http://tools.ietf.org/html/rfc4122**.

[8] R. Fielding *et al.*, 1999: Hypertext Transfer Protocol -- HTTP/1.1. RFC 2616. Section 14.25 **http://tools.ietf.org/html/rfc2616#section-14.25** describes the If-Modified-Since function.

```
<?xml version="1.0" encoding="UTF-8"?>
<feed xmlns="http://www.w3.org/2005/Atom">
  <updated>2012-10-29T07:44:20Z</updated>
  ... metadata of the feed ...
  <author><name>RSMC Tokyo - Typhoon Centre</name></author>
  <entry>
    <updated>2012-10-29T06:40:57.001Z</updated>
    <title>... CAP headline ...</title>
    <summary>
      <div xmlns="http://www.w3.org/1999/xhtml">... CAP description ...</div>
    </summary>
    <id>urn:uuid:4684c9e6-1fad-3a83-b797-43b40c62a6de</id>
    <content type="application/cap+xml">
      <cap:alert xmlns:cap="urn:oasis:names:tc:emergency:cap:1.2">
        <cap:identifier>urn:uuid:4684c9e6-1fad-3a83-b797-43b40c62a6de</cap:identifier>
        ... CAP message  ...
      </cap:alert>
    </content>
  </entry>
  ... subsequent entries (if any) ...
</feed>
```

Figure 2: structure of CAP-embedded Atom Feed used by RSMC Tokyo-Typhoon Centre.

browsers) can display the summary of the TC advisory.

3.2. Structure of CAP Message

A CAP message is an XML document whose root element is “**alert**” having namespace “**urn:oasis:names:tc:emergency:cap:1.2**”. RSMC Tokyo uses prefix “**cap:**” in the XML element name to indicate CAP namespace, like <cap:**alert**>, but in general, it is not recommended to rely on this. It is recommended to use XML parser that understands namespace.

Figure 3 illustrates rough structure of CAP-RSMCTK. Structure under <cap:**alert**> is quite simplified in comparison to the CAP specification. There is no optional element (that may be missing) directly under <cap:**alert**> or <cap:**info**>. That means application programmers won’t have to worry about preparing for missing elements such as <cap:**effective**>, <cap:**onset**>, <cap:**expires**>, ... All optional information are given in <cap:**parameter**> or <cap:**area**> (described in Sections 5 and 4.3, respectively).

3.3. How Many Messages in a Feed?

One thing worth to think about is how many new <cap:**alert**> messages may appear in the Atom feed. There are two reasons for the feed to contain many messages.

Firstly, when there are many tropical cyclones in the RSMC Tokyo’s responsibility area, the center issues as many advisory bulletins (plain text version) as the cyclones. Conventional system supports six cyclones at one time at maximum: the same type of TC advisory uses six different GTS headings (WTPQ20 RJTD is the first cyclone and WTPQ25 RJTD is the sixth one), though four cyclones at a time is very rare.

Secondly, a text bulletin is splitted into multiple <cap:**alert**> messages for simplicity inside the message[9]. At maximum[10] four messages may be created for four forecast times (analysis, and 24, 48,

[9] Primary reason for creating separate <cap:**alert**> for each <cap:**info**> is simple strucutre for handling. However, if the community prefers, it is technically possible to change this so that only one

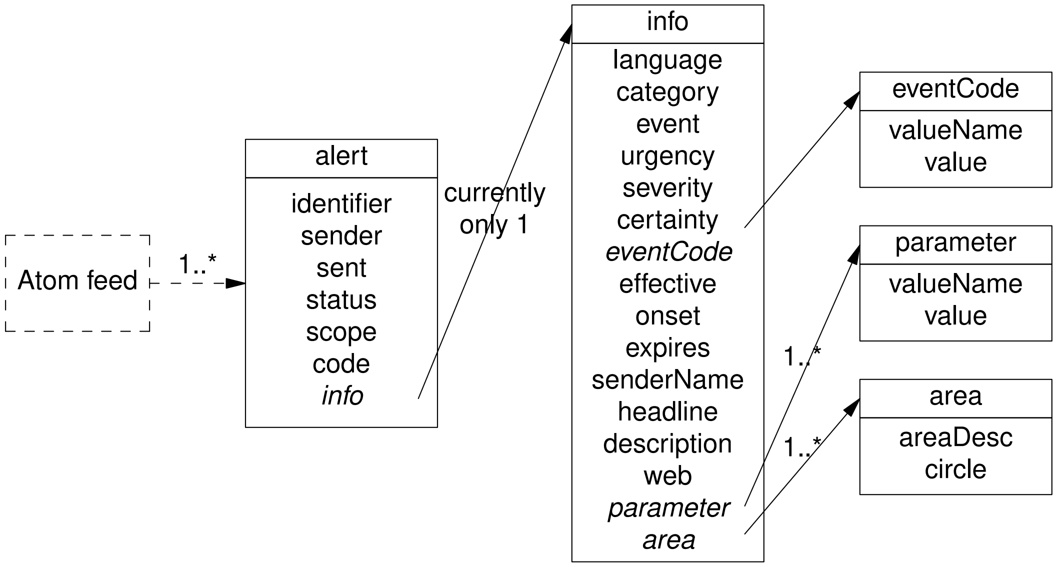

Figure 3: structure of CAP message of CAP-RSMCTK profile. Boxes and italic letters indicate XML elements containing child elements. Upright letters (ex. "identifier") in the boxes indicate ‘leaf-node’ XML elements that contain text. Arrows with note ‘**1..***’ indicate repeatable element. Other element (including all leaf nodes) appears always and only once in CAP-RSMCTK profile. All elements must have namespace URI “**urn:oasis:names:tc:emergency:cap:1.2**”.

72 hours of forecast).

3.4. Updates between Messages

If your application has to manage updates between successive advisories, a suggested way is to split Atom feed into <cap:**alert**> messages to store as separated files or database entries.

- When new messages (<cap:**sent**> is newer than stored messages) arrives, search past messages by **TC_Number** attribute.
- Messages with the same **TC_Number** and older <cap:**sent**> can be updated.
- If newer message has parameter **TC_Remark** to signal termination of work, the messages for the cyclone can be discarded.
- Anyway it is suggested to implement <cap:**expiration**> as a fail-safe measure to remove stale information.

4. Values of XML Elements

Following sections describe the specifications of values (content text) of XML Elements in CAP messages. Each description consists of, at least, XPath[11] (location in the message, or how can we retrieve value), data type[12] (whether the element can hold arbitrary text, or allows only limited value), definition in CAP 1.2, and notes and discussion that apply only to CAP-RSMCTK messages. ‘Google Profile’ refers to Google’s guideline[13], which includes one of the best technical reviews of

<cap:**alert**> is sent for a cyclone at a time and that includes multiple <cap:**info**> blocks.

[10] It is possible that the number of messages are less than four.

[11] J. Clark and S. DeRose, 1999: XML Path Language (XPath) Version 1.0. W3C Recommendation 16 November 1999. **http://www.w3.org/TR/xpath/**.

[12] Names beginning with ‘xs:’ are data types of XML Schema. For definitions refer to: P.V. Biron et al., 2004: XML Schema Part 2: Datatypes Second Edition. W3C Recommendation 28 October 2004. **http://www.w3.org/TR/xmlschema-2/**.

existing CAP profiles.

4.1. Elements under <cap:alert>

4.1.1. identifier

XPath
: cap:alert/cap:identifier

Type
: xs:string

CAP 1.2 definition
: The identifier of the alert message (REQUIRED, ONLY-ONCE)

  (1) A number or string uniquely identifying this message, assigned by the sender.

  (2) MUST NOT include spaces, commas or restricted characters (< and &).

CAP-RSMCTK usage
: RSMC Tokyo uses identifiers are given in UUID URN format.

  The format is intentionally chosen to make it clear that the only role of the identifier is to tell different messages by different identifiers, and JMA discourages sometimes-found practice to find related messages by changing substring of identifiers. See also Section 5.1 about updating of past messages describing the same tropical cyclone.

Example
: <cap:identifier>urn:uuid:2efd97da-4ba5-3a40-92ca-af3cce7549d4</cap:identifier>

4.1.2. sender

XPath
: cap:alert/cap:sender

Type
: xs:string

CAP 1.2 definition
: The identifier of the sender of the alert message (REQUIRED, ONLY-ONCE)

  (1) Identifies the originator of this alert. Guaranteed by assigner to be unique globally; e.g., may be based on an Internet domain name.

  (2) MUST NOT include spaces, commas or restricted characters (< and &).

CAP-RSMCTK usage
: RSMC Tokyo uses fixed email address.

Example
: <cap:sender>rsmc-tokyo@met.kishou.go.jp</cap:sender>

[13] N. Snoad and S. Hakusa, 2012: Google Public Alerts Technical Guide – Google CAP documentation and additional requirements to get CAP ready for the Web. Version: Public v1.0. **http://goo.gl/CEwqo**.

4.1.3. sent

XPath
: cap:alert/cap:sent

Type
: xs:dateTime,
pattern = "\d{4}-\d\d-\d\dT\d\d:\d\d:\d\d[+-]\d\d:\d\d"

CAP 1.2 definition
: The time and date of the origination of the alert message (REQUIRED, ONLY-ONCE)

(1) The date and time SHALL be represented in the DateTime Data Type format (e.g., “2002-05-24T16:49:00-07:00” for 24 May 2002 at 16:49 PDT).

(2) Alphabetic timezone designators such as “Z” MUST NOT be used. The timezone for UTC MUST be represented as “-00:00”.

CAP-RSMCTK usage
: In RSMC Tokyo’s CAP messages, the value of <cap:**sent**> is the actual time of the dissemination of message.

Note that the message may not be visible on the Atom feed at the time <cap:**sent**>, since it may take several minutes for processing in current experimental setting.

Also note that the value is not best suited for displaying. End users with knowledge of meteorology are more interested to see analysis time (parameter **TC_AnalysisTime**).

Example
: <cap:sent>2011-08-04T13:31:14+00:00</cap:sent>

Known Issue
: The timezone designator is currently "+00:00" for UTC but has to be "-00:00".

4.1.4. status

XPath
: cap:alert/cap:status

Type
: xs:string, but limited to coded word (see table below)

CAP 1.2 definition
: The code denoting the appropriate handling of the alert message (REQUIRED, ONLY-ONCE)

Value	Meaning
Actual	Actionable by all targeted recipients
Exercise	Actionable only by designated exercise participants; exercise identifier SHOULD appear in <cap:**note**>
Test	Technical testing only, all recipients disregard
System	For messages that support alert network internal functions
Draft	A preliminary template or draft, not actionable in its current form

CAP-RSMCTK usage
: RSMC Tokyo uses ‘**Actual**’ and ‘**Test**’. ‘**Exercise**’ is reserved for exercise activity.

4.1.5. msgType

XPath

cap:alert/cap:msgType

Type

xs:string, but limited to coded word (see table below)

CAP 1.2 definition

The code denoting the nature of the alert message (REQUIRED, ONLY-ONCE)

Value	Meaning
Alert	Initial information requiring attention by targeted recipients
Update	Updates and supersedes the earlier message(s) identified in <cap:**references**>
Cancel	Cancels the earlier message(s) identified in <cap:**references**>
Ack	Acknowledges receipt and acceptance of the message(s) identified in <cap:**references**>
Error	Indicates rejection of the message(s) identified in <cap:**references**>; explanation SHOULD appear in <cap:**note**>

CAP-RSMCTK usage

RSMC Tokyo uses only '**Alert**', since we cannot give <cap:**references**> in reliable manner.

See also Section 3.4 for how to find out past messages describing the same tropical cyclone, for which someone would expect Update or Cancel.

4.1.6. scope

XPath

cap:alert/cap:scope

Type

xs:string, but limited to coded word (see table below)

CAP 1.2 definition

The code denoting the intended distribution of the alert message (REQUIRED, ONLY-ONCE)

Value	Meaning
Public	For general dissemination to unrestricted audiences
Restricted	For dissemination only to users with a known operational requirement (optional <cap:**restriction**> is used in this case)
Private	For dissemination only to specified addresses (optional <cap:**addresses**> is used in this case)

CAP-RSMCTK usage

RSMC Tokyo uses only '**Public**', since it is inappropriate to prescribe <cap:**restriction**> or <cap:**address**> that are understood as (unintended) request of access control.

4.1.7. code

XPath

cap:alert/cap:code

Type

xs:string

CAP 1.2 definition

The code denoting the special handling of the alert message (OPTIONAL)

(1) Any user-defined flag or special code used to flag the alert message for special handling.

(2) Multiple instances MAY occur.

CAP-RSMCTK usage

RSMC Tokyo's CAP message include one and only one <cap:**code**> element with value '**CAP-RSMCTK**', which indicates that the message is following the profile.

4.1.8. info

XPath

cap:alert/cap:info

Type

complex type containing child elements described in following Section 4.2

CAP 1.2 definition

The container for all component parts of the info sub-element of the alert message (OPTIONAL)

(1) Multiple occurrences are permitted within a single <cap:**alert**>. If targeting of multiple <cap:**info**> blocks in the same language overlaps, information in later blocks may expand but may not override the corresponding values in earlier ones. Each set of <cap:**info**> blocks containing the same language identifier SHALL be treated as a separate sequence.

(2) In addition to the specified sub-elements, MAY contain one or more <cap:**resource**> blocks and/or one or more <cap:**area**> blocks.

Other Profiles

Google Profile requires at least one <cap:**info**> block. That's natural requirement.

CAP-RSMCTK usage

At the time of writing, RSMC Tokyo creates only one <cap:**info**> is included in one <cap:**alert**> message. In the future, however, it should be good to be prepared for multiple <cap:**info**> blocks in one <cap:**alert**> to support multi-language message. We propose to have <cap:**info**> block in English language at the first position.

Recipient centre is thus advised to specify the first instance of <cap:**info**> ('.../**cap:info[1]**/...' in XPath language) to access the contents of <cap:**info**> block.

4.2. Elements under <cap:info>

4.2.1. language

XPath
: cap:alert/cap:info[1]/cap:language

Type
: xs:language

CAP 1.2 definition
: The code denoting the language of the info sub-element of the alert message (OPTIONAL, ONLY-ONCE)

(1) Code Values: Natural language identifier per RFC 3066[14].

(2) If not present, an implicit default value of "en-US" SHALL be assumed.

(3) A null value in this element SHALL be considered equivalent to "en-US."

CAP-RSMCTK usage
: At the time of writing, RSMC Tokyo always uses "**en-US**".

4.2.2. category

XPath
: cap:alert/cap:info[1]/cap:category

Type
: xs:string, but limited to coded word (see table below)

CAP 1.2 definition
: The code denoting the category of the subject event of the alert message (REQUIRED)

(1) Code Values:

Value	Meaning
Geo	Geophysical (inc. landslide)
Met	Meteorological (inc. flood)
Safety	General emergency and public safety
Security	Law enforcement, military, homeland and local/private security
Rescue	Rescue and recovery
Fire	Fire suppression and rescue
Health	Medical and public health
Env	Pollution and other environmental
Transport	Public and private transportation
Infra	Utility, telecommunication, other non-transport infrastructure
CBRNE	Chemical, Biological, Radiological, Nuclear or High-Yield Explosive threat or attack
Other	Other events

(2) Multiple instances MAY occur within an <cap:**info**> block.

CAP-RSMCTK usage
: RSMC Tokyo creates only one <cap:**category**> element with value '**Met**'.

[14] H. Alvestrand, 2001: Tags for the Identification of Languages. RFC 3066. **http://tools.ietf.org/html/rfc3066**.

4.2.3. event

XPath
cap:alert/cap:info[1]/cap:event

Type
xs:string

CAP 1.2 definition
The text denoting the type of the subject event of the alert message (REQUIRED, ONLY-ONCE)

Other Profile
Google Profile requires the length of <cap:**event**> must be less than 35 characters. It seems like the CAP implementing community does not expect lengthy text here, even though CAP's XML Schema does not pose limitation.

CAP-RSMCTK usage
RSMC Tokyo creates <cap:**event**> having value either
"**TROPICAL CYCLONE ADVISORY/ANALYSIS**" or
"**TROPICAL CYCLONE ADVISORY/FORECAST**" (both are 34 characters length) depending on the time the <cap:**info**> block is describing.

4.2.4. urgency

XPath
cap:alert/cap:info[1]/cap:urgency

Type
xs:string, but limited to coded word (see table below)

CAP 1.2 definition
The code denoting the urgency of the subject event of the alert message (REQUIRED, ONLY-ONCE)

(1) The <cap:**urgency**>, <cap:**severity**>, and <cap:**certainty**> elements collectively distinguish less emphatic from more emphatic messages.

(2) Code Values:

Value	Meaning
Immediate	Responsive action SHOULD be taken immediately
Expected	Responsive action SHOULD be taken soon (within next hour)
Future	Responsive action SHOULD be taken in the near future
Past	Responsive action is no longer required
Unknown	Urgency not known

CAP-RSMCTK usage
At the time of writing, RSMC Tokyo generates only "**Unknown**" as urgency code. We might be able to change it if adequate policy coordination is done in the future.

4.2.5. severity

XPath

cap:alert/cap:info[1]/cap:severity

Type

xs:string, but limited to coded word (see table below)

CAP 1.2 definition

The code denoting the severity of the subject event of the alert message (REQUIRED, ONLY-ONCE)

(1) The <cap:**urgency**>, <cap:**severity**>, and <cap:**certainty**> elements collectively distinguish less emphatic from more emphatic messages.

(2) Code Values:

Value	Meaning
Extreme	Extraordinary threat to life or property
Severe	Significant threat to life or property
Moderate	Possible threat to life or property
Minor	Minimal to no known threat to life or property
Unknown	Severity not known

CAP-RSMCTK usage

At the time of writing, RSMC Tokyo generates only “**Unknown**” as severity code. We might be able to change it if adequate policy coordination is done in the future.

4.2.6. certainty

XPath

cap:alert/cap:info[1]/cap:certainty

Type

xs:string, but limited to coded word (see table below)

CAP 1.2 definition

The code denoting the certainty of the subject event of the alert message (REQUIRED, ONLY-ONCE)

(1) The <cap:**urgency**>, <cap:**severity**>, and <cap:**certainty**> elements collectively distinguish less emphatic from more emphatic messages.

(2) Code Values:

Value	Meaning
Observed	Determined to have occurred or to be ongoing
Likely	Likely (p > ~50%)
Possible	Possible but not likely (p ≤ ~50%)
Unlikely	Not expected to occur (p ~ 0)
Unknown	Certainty not known

(3) For backward compatibility with CAP 1.0, the deprecated value of “Very Likely” SHOULD be treated as equivalent to “Likely”.

CAP-RSMCTK usage

RSMC Tokyo uses “**Observed**” and “**Likely**” for <cap:**info**> blocks of analysis and forecast, respectively. We chose “Likely” because the advisory informs (at least) the location of the cyclone with enough probability (70 % within circle).

4.2.7. eventCode

XPath
cap:alert/cap:info[1]/cap:eventCode

Type
complex type, containing two child elements <cap:**valueName**> and <cap:**value**> (both xs:string).

CAP 1.2 definition
A system-specific code identifying the event type of the alert message (OPTIONAL)

CAP-RSMCTK usage
RSMC Tokyo's CAP message contains one and only one <cap:**eventCode**> having valueName="**EventType**" and one of following values:

Value	Meaning
TC_Analysis	analysis
TC_Forecast24	24 hour forecast
TC_Forecast45	45 hour forecast
TC_Forecast48	48 hour forecast
TC_Forecast69	69 hour forecast
TC_Forecast72	72 hour forecast

Example
```
<cap:eventCode>
<cap:valueName>EventType</cap:valueName>
<cap:value>TC_Forecast24</cap:value>
</cap:eventCode>
```

4.2.8. effective

XPath
cap:alert/cap:info[1]/cap:effective

Type
xs:dateTime,
pattern = "\d{4}-\d\d-\d\dT\d\d:\d\d:\d\d[+-]\d\d:\d\d"

CAP 1.2 definition
The effective time of the information of the alert message (OPTIONAL, ONLY-ONCE)

(1–2)
notes on time format same as in <cap:sent> (Section 4.1.3).

(3) If this item is not included, the effective time SHALL be assumed to be the same as in <cap:**sent**>.

CAP-RSMCTK usage
RSMC Tokyo always gives this element for TC advisory. The value is the time at which the message formally takes effect, and usually has a few minutes difference from <cap:**sent**>. This is merely made for consistency with other alerting practices, and there is *no* intention that Typhoon Committee members should wait for the time of <cap:**effective**>.

4.2.9. onset

XPath
: cap:alert/cap:info[1]/cap:onset

Type
: xs:dateTime,
: pattern = "\d{4}-\d\d-\d\dT\d\d:\d\d:\d\d[+-]\d\d:\d\d"

CAP 1.2 definition
: The expected time of the beginning of the subject event of the alert message (OPTIONAL, ONLY-ONCE)

(1–2)
: *notes on time format same as in <cap:sent> (Section 4.1.3).*

CAP-RSMCTK usage
: RSMC Tokyo *always* gives this element. The value is valid time, the time the <cap:**info**> block is describing about. It is earlier than <cap:**sent**> for analysis, and later than <cap:**sent**> for forecast.

Caution
: The usage is a little different from typical usage of <cap:**onset**>, although we had to do so as the valid time is essential in forecast track.

4.2.10. expires

XPath
: cap:alert/cap:info[1]/cap:expires

Type
: xs:dateTime,
: pattern = "\d{4}-\d\d-\d\dT\d\d:\d\d:\d\d[+-]\d\d:\d\d"

CAP 1.2 definition
: The expiry time of the information of the alert message (OPTIONAL)

(1–2)
: *notes on time format same as in <cap:sent> (Section 4.1.3).*

(3) If this item is not provided, each recipient is free to set its own policy as to when the message is no longer in effect.

Other Profiles
: Google Profile requires this element is present, and the value is after <cap:**effective**>. CAP publishers are supposed to choose either a CAP message expires by this element or is updated or cancelled by another message using <cap:**references**>.

CAP-RSMCTK usage
: RSMC Tokyo always gives <cap:**expires**>, since our current technical environment doesn't allow us to give appropriate <cap:**references**>. Contents of TC advisory are updated at least six-hourly, thus <cap:**expires**> is 90 minutes after next map time (multiple of six hours). Please see Section 3.4 for more complete updating.

4.2.11. senderName

XPath
: cap:alert/cap:info[1]/cap:senderName

Type
: xs:string

CAP 1.2 definition
: The text naming the originator of the alert message (OPTIONAL). The human-readable name of the agency or authority issuing this alert.

CAP-RSMCTK usage
: RSMC Tokyo uses “**RSMC Tokyo - Typhoon Center**”.

4.2.12. headline

XPath
: cap:alert/cap:info[1]/cap:headline

Type
: xs:string

CAP 1.2 definition
: The text headline of the alert message (OPTIONAL). A brief human-readable headline. Note that some displays (for example, short messaging service devices) may only present this headline; it SHOULD be made as direct and actionable as possible while remaining short. 160 characters MAY be a useful target limit for headline length.

Other Profile
: Google Profile requires the length of <cap:**event**> must be less than 140 characters.

CAP-RSMCTK usage
: RSMC Tokyo always gives this element. Headline is brief summary text of contents. See also Section 6.1 for examples.

4.2.13. description

XPath
: cap:alert/cap:info[1]/cap:description

Type
: xs:string

CAP 1.2 definition
: The text describing the subject event of the alert message (OPTIONAL). An extended human readable description of the hazard or event that occasioned this message.

Other Profile
: Google Profile requires this element.

CAP-RSMCTK usage
: RSMC Tokyo always gives this element. Description is summary text of contents. See also Section 6.2 for examples.

4.2.14. web

XPath
: cap:alert/cap:info[1]/cap:web

Type
: xs:anyURI

CAP 1.2 definition
: The identifier of the hyperlink associating additional information with the alert message (OPTIONAL). A full, absolute URI for an HTML page or other text resource with additional or reference information regarding this alert.

CAP-RSMCTK usage
: RSMC Tokyo always gives this element.

Known Issue
: *The URL is always the same in current implementation. URL for the specific cyclone should be used instead.*

4.2.15. parameter

XPath
: cap:alert/cap:info[1]/cap:parameter

Type
: complex type, containing two child elements <cap:**valueName**> and <cap:**value**> (both xs:string).

CAP 1.2 definition
: A system-specific additional parameter associated with the alert message (OPTIONAL)

CAP-RSMCTK usage
: Variable number of parameters are given in one <cap:**info**>. See also Section 5 for list and contents.

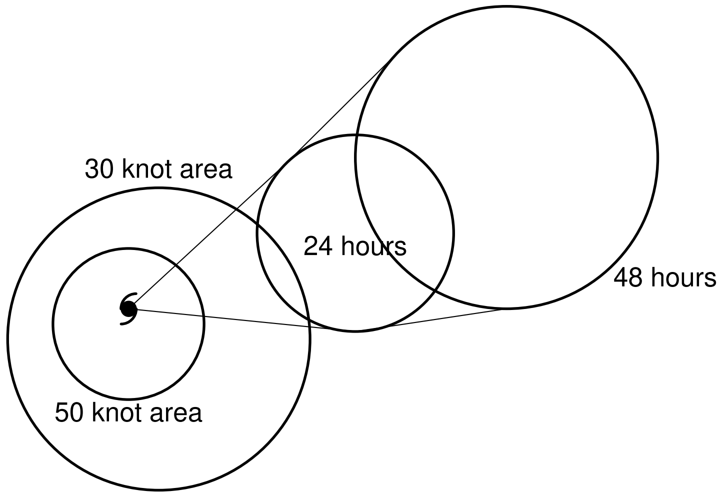

Figure 4: style in which <cap:**area**> information is preferably drawn on map. Letters are only for explanation. Circles in this figure are given as <cap:**circle**> elements.

4.2.16. area

XPath

cap:alert/cap:info[1]/cap:area

Type

complex type, containing child elements described in Section 4.3

CAP 1.2 definition

The container for all component parts of the area sub-element of the info sub-element of the alert message (OPTIONAL)

Other Profiles

Google Profile requires this element.

CAP-RSMCTK usage

TC advisory includes several types of geospatial information, i.e. data that can be drawn on map like Figure 4. Both analysis and forecast are associated with area(s) of circular shape.

(1a) For analysis, the first one is for estimated position of center,

(1b) When available, area of wind more than 30 knot follows, and

(1c) When available, area of wind more than 50 knot follows.

(2) For forecast, the first one is probability circle; The center of tropical cyclone will be in the circle with 70 % probability.

Examples

```
<cap:area>
  <cap:areaDesc>Sea South of Okinawa</cap:areaDesc>
  <cap:circle>24.9,128.6 0</cap:circle>
</cap:area>
<cap:area>
  <cap:areaDesc><!-- 30 knot wind area --></cap:areaDesc>
  <cap:circle>24.9,129.5 465</cap:circle>
</cap:area>
<cap:area>
  <cap:areaDesc><!-- 50 knot wind area --></cap:areaDesc>
  <cap:circle>25.1,128.6 195</cap:circle>
</cap:area>
```

Known Issue

It is not very easy to draw lines to connect probability circles. It would be user-friendly to add polygon for cone.

4.3. Elements under <area>

4.3.1. areaDesc

XPath
: cap:alert/cap:info[1]/cap:area/cap:areaDesc

Type
: xs:string

CAP 1.2 definition
: The text describing the affected area of the alert message (REQUIRED, ONLY-ONCE)

CAP-RSMCTK usage
: For the first <cap:**area**> block in the <cap:**info**> block [i.e. cases (1a) and (1b) of Section 4.2.16], geographical area description of the center (of the probability circle) is given.

  For subsequent <cap:**area**> blocks (if any), the element is empty.

Example
: <cap:areaDesc>Sea South of Okinawa</cap:areaDesc>

4.3.2. circle

XPath
: cap:alert/cap:info[1]/cap:area/cap:circle

Type
: xs:string
  (unofficial pattern = "[-+]?\d+\.?\d*,[-+]?\d+\.?\d* \d+" although not enforced in XML Schema by OASIS)

CAP 1.2 definition
: The paired values of a point and radius delineating the affected area of the alert message (OPTIONAL)

  (1) Code Values: The circular area is represented by a central point given as a [WGS 84] coordinate pair followed by a space character and a radius value in kilometers.

  (2) Multiple instances MAY occur within an <area> block.

CAP-RSMCTK usage
: The content gives latitude, longitude, and radius of circle. Latitude and longitude are separated by comma (without space), and they are separated by single space. Estimated center [i.e. case (1a) of Section 4.2.16] is a point, and thus indicated by circle with radius zero.

Example
: <cap:circle>25.1,128.6 195</cap:circle>

Department of Defense World Geodetic System 1984, Its Definition and Relationships With Local Geodetic Systems. NIMA Technical Report TR8350.2. **http://earth-info.nga.mil/GandG/publications/tr8350.2/tr8350_2.html**.

5. Parameters

5.1. TC_Number

Type

xs:nonNegativeInteger, pattern = “[0-9]{4}”
(i.e. four digit number, zero filled at left)

CAP-RSMCTK definition

Unique number of tropical cyclone for tracking (REQUIRED).

Whenever RSMC Tokyo issues advisory for a new tropical cyclone, a number is allocated to it. All subsequent advisories for the cyclone have the same TC_Number parameter. It is not to be confused with parameter TC_CycloneID which is given when a tropical cyclone is upgraded to “tropical storm”.

If applications should update or cancel past information, search all <cap:**alert**> instances that has same **TC_Number** parameter. All <cap:**alert**> instances with older <cap:**sent**> time are to be updated. See also parameter **TC_Remark** (Section 5.2).

5.2. TC_Remark

Type

limited to coded word (see table below)

CAP-RSMCTK definition

Change of classification, current or expected (OPTIONAL).

Name	When used	Meaning
Upgrading	Forecast	TD is becoming TS
Upgraded	Analysis	TD became TS
Downgraded	Analysis	TS became TD
Cancels_Upgrade	Analysis	TD had been forecast to be TS before, but that was cancelled
Incoming	Analysis	TC came into RSMC responsibility area
Outgoing	Analysis	TC came out of RSMC responsibility area
Becoming_Low	Forecast	TC is becoming extra-tropical low
Became_Low	Analysis	TC became extra-tropical low

Remarks **Downgraded**, **Became_Low**, **Outgoing**, and **Cancels_Upgrade** signals termination of typhoon operation: i.e. they tell that there will be no subsequent messages on this cyclone.

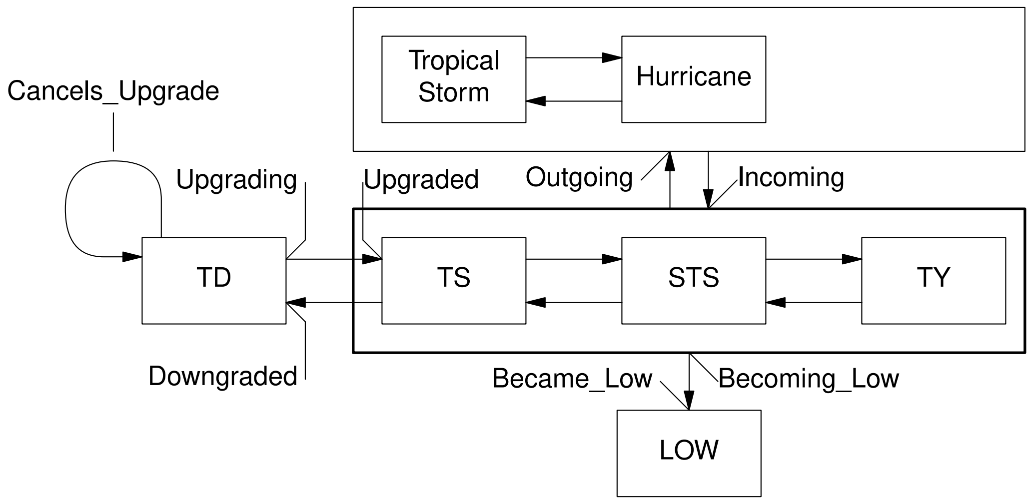

Figure 5: change of TC_Classification and TC_Remark. Remarks at beginning of arrow are used in forecast when change is expected. Remarks at end of arrow are used in analysis when change took place.

5.3. TC_Classification

Type

limited to coded word (see table below)

CAP-RSMCTK definition

Classification of cyclone (OPTIONAL).

Tropical cyclone is sub-classified by maximum sustained wind (MWND). Different system of classification is used in area of responsibility of RSMC Honolulu, and such names are used when a tropical cyclone is expected to cross (or has crossed) 180th meridian.

Value	Spelled	RSMC	MWND
TY	Typhoon	Tokyo	≥ 64 knots
STS	Severe Tropical Storm	Tokyo	48-63 knots
TS	Tropical Storm	Tokyo	34-47 knots
TD	Tropical Depression	Tokyo	≤ 33 knots
Hurricane		Honolulu	≥ 64 knots
Tropical Storm		Honolulu	≤ 63 knots
LOW	Extra-tropical low		

Note:

Currently this parameter is always given, but application developpers are advised not to rely on it for future extension.

5.4. TC_CycloneName

Type

Limited to list of names, but the list sometimes changes

CAP-RSMCTK definition

Name of tropical cyclone, adopted by the Typhoon Committee (OPTIONAL).

A name (together with identification number) is given to a tropical cyclone when it is upgraded to “tropical storm”. The list of name for tropical cyclone is given as Appendix 1-C of TCP-23.

5.5. TC_CycloneID

Type

xs:nonNegativeInteger, pattern = “[0-9]{4}”
(i.e. four digit number, zero filled at left)

CAP-RSMCTK definition

Identification number of tropical cyclone (OPTIONAL).

An identification number (together with an associated name) is given to a tropical cyclone when it is upgraded to “tropical storm”. It is not to be confused with paraemeter TC_Number which is always present.

5.6. TC_MovingDirection

Type

Limited to 16 directions: ‘**NNE**’, ‘**NE**’, ‘**ENE**’, ‘**E**’, ... ‘**NNW**’, and ‘**N**’.

CAP-RSMCTK definition

Moving direction of tropical cyclone (REQUIRED)

5.7. TC_MovingSpeed

Type

Explicit words “**ALMOST STATIONARY**”, “**SLOWLY**”, or positive integer with suffix “ **kt**”

CAP-RSMCTK definition

Moving speed of tropical cyclone (REQUIRED)

Caution

The speed in knots, and units are explicitly shown like “**30 kt**” to avoid mistake.

5.8. TC_PositionConfidence

Type

Limited to coded word (see table below)

CAP-RSMCTK definition

Confidence of position of tropical cyclone Analysis (OPTIONAL)

Value	Meaning
GOOD	radius of 30 nautical miles (55 km) or less
FAIR	radius of 30 to 60 nautical miles (55 to 110 km)
POOR	radius of greater than 60 nautical miles (110 km)

5.9. TC_CenterPressure

Type
: Positive integer suffixed with " **hPa**"

CAP-RSMCTK definition
: Pressure at center of tropical cyclone (OPTIONAL)

Caution
: The pressure is in hectopascals, and units are explicitly shown like "**970 hPa**" to avoid mistake.

5.10. TC_MaxSustainedWind

Type
: Positive integer suffixed with " **kt**"

CAP-RSMCTK definition
: Maximum sustained wind speed of tropical cyclone (OPTIONAL). RSMC Tokyo uses average over ten minutes as definition of the term 'sustained wind speed'.

Caution
: The speed in knots, and units are explicitly shown like "**30 kt**" to avoid mistake.

5.11. TC_PeakGust

Type
: Positive integer suffixed with " **kt**"

CAP-RSMCTK definition
: Gust speed of tropical cyclone (OPTIONAL)

Caution
: The speed in knots, and units are explicitly shown like "**30 kt**" to avoid mistake.

5.12. EventEndTime (really experimental)

Type
: xs:dateTime,
: pattern = "\d{4}-\d\d-\d\dT\d\d:\d\d:\d\d[+-]\d\d:\d\d"

CAP-RSMCTK definition
: Current implementation gives this parameter having value same to with <cap:**onset**>, or valid time of analysis/forecast. The intention is to signal implementations following Google Profile, which should interpret the time interval between onset and EventEnd-Time as duration of event.
: The notation is really experimental, and prone to future changes.

5.13. TC_AnalysisTime

Type
: xs:dateTime,
: pattern = "\d{4}-\d\d-\d\dT\d\d:\d\d:\d\d[+-]\d\d:\d\d"

CAP-RSMCTK definition
: The parameter gives analysis time. Observations by that time are used in creation of this product. Normally the analysis time is the latest multiple of 3 hours before <cap:**sent**>.

5.14. Wind area parameters

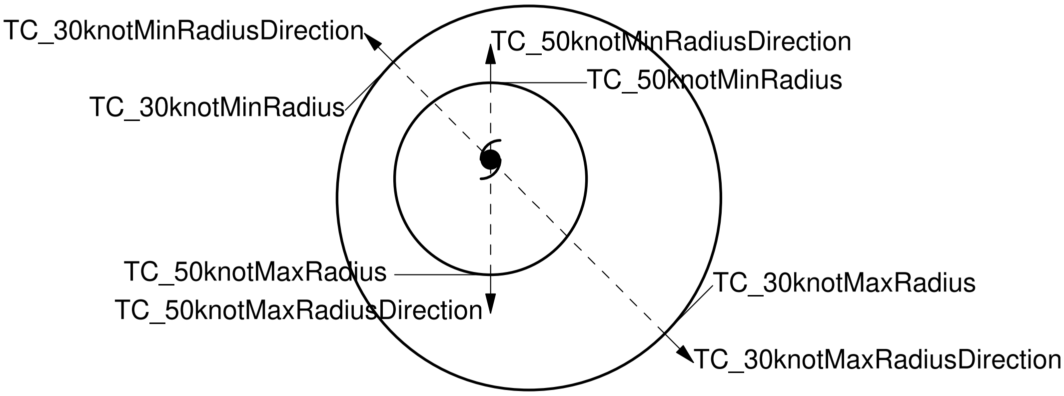

Figure 6: parameters and wind areas.

5.14.1. Wind area radius

Name
: TC_30knotMaxRadius, TC_30knotMinRadius, TC_50knotMaxRadius, and TC_50knotMinRadius

Type
: Positive integer suffixed with “ **km**”

CAP-RSMCTK definition
: Maximum (or minimum) radius of 30 (or 50) knot wind area (OPTIONAL)

- The distance is in kilometers, and units are explicitly shown like “**300 km**” to avoid mistake.
- When the wind area has the same radius for all directions, ‘Min’ and ‘Max’ parameters are given with same value.

5.14.2. Direction of wind area radii

Name
: TC_30knotMaxRadiusDirection, TC_30knotMinRadiusDirection, TC_50knotMaxRadiusDirection, and TC_50knotMinRadiusDirection

Type
: Limited to eight directions: ‘**NE**’, ‘**E**’, ‘**SE**’ ... ‘**NW**’, and ‘**N**’.

CAP-RSMCTK definition
: Direction of maximum (or minimum) radius of 30 (or 50) knot wind area (OPTIONAL)

- When the wind area has the same radius for all directions, ‘Min’ and ‘Max’ direction parameters are both omitted.

6. Appendices

6.1. Examples of headline text

6.1.1. Syntax

The text in <cap:**headline**> is compact text to describe the content i.e. analysis or one valid time of TC advisory. Abbreviations (similar to WTPQ20-25 RJTD) are used to keep text compact.

Current implementation uses syntax as follows. If the result is 140 characters or more, it is truncated to 138 characters and ellipsis (U+2026 ‘…’) is appended. Also note that symbols for degree (U+00B0

'°') and plus-minus (U+00B1 '±') are used other than ASCII for compactness.

Disclaimer: Syntax shown below is informational purpose only. It is discouraged to machine-process the text, since (1) change is highly likely, (2) truncation take place sometimes, and (3) it is much better to use CAP elements and parameters.

headline :=
  cyclone *time*':' *center* *move* *pres* [*change*] [*mxwd*] [*gust*] [*area30kt* [*area50kt*]]

cyclone :=
  class **expected upgrading**
  | *class* **no longer upgrading**
  | **new** *class* *name* '**(**'*id*'**)**'
  | *class* *name* '**(**'*id*'**)**'
  | *class* *name* '**(**'*id*'**)**' **becoming LOW**
  | *name* '**(**'*id*'**)**' **became** *class*

time :=
  ANALYSIS '**(**'*vtime***UTC**'**)**'
  | **FCST** *integer***h** '**(**'*vtime***UTC**'**)**'

vtime :=
  integer { valid time in four digit; two digit for day in month and two for hour) }

class :=
  TD | **TS** | **STS** | **TY** | **Tropical Storm** | **Hurricane** | **LOW**

center :=
  number°**N** *number*(°**E**|°**W**) [*confidence* | *probabilitycircle*]

confidence :=
  GOOD | **FAIR** | **POOR**

probabilitycircle :=
  '±' *integer* **km**

move :=
  MOVE *dir16* *speed* | **MOVE** *dir16* **SLOWLY** | **MOVE ALMOST STATIONARY**

dir16 :=
  NNE | **NE** | **ENE** | **E** | **ESE** | **SE** | **SSE** | **S** | **SSW** | **SW** | **WSW** | **W** | **WNW** | **NW** | **NNW** | **N**

speed :=
  integer **kt**

pres :=
  PRES *integer* **hPa**

change :=
  TOBE *class*

mxwd :=
  MXWD *speed*

gust :=
  GUST *speed*

area30kt :=
  R30KT *area*

area50kt :=
  R50KT *area*

area :=
  integer **km** [*dir8* *integer* **km** *dir8*]

dir8 :=
  NE | **E** | **SE** | **S** | **SW** | **W** | **NW** | **N**

6.1.2. Examples

When there is a TD that is expected to be TS in 24 hours, typically two <cap:**alert**> messages with following style of headlines are issued. At this point the cyclone doesn't have name and ID number, and is called simply 'TD expected upgrading'.

```
TD expected upgrading ANALYSIS (2006UTC): 13.8°N 133.4°E POOR MOVE W 13 kt PRES 1006
hPa MXWD 30 kt GUST 45 kt
```

Please note that the date and time in the parenthesis is valid time, so 24 hour forecast issued for 2006UTC analysis is valid for 2106UTC. Forecast info has 'TOBE TS' to signal expected upgrading.

```
TD expected upgrading FCST 24h (2106UTC): 13.8°N 131.8°E ±220 km MOVE W SLOWLY
PRES 1000 hPa TOBE TS MXWD 35 kt GUST 50 kt
```

When the TD becomes TS or higher classification, it is called with name and id like 'TY MUIFA (1109)'. Area of 50 knot wind is often truncated due to size limitation of <cap:**headline**>, but at least we can infer there is 50 knot area because maximum sustained wind (MWND) is more than 50 knots.

```
TY MUIFA (1109) ANALYSIS (0412UTC): 24.9°N 128.6°E GOOD MOVE W SLOWLY PRES 945
hPa MXWD 85 kt GUST 120 kt R30KT 560 km E 370 km W R50KT 22…
```

When the storm is expected to change its shape to be LOW, that is indicated by 'TOBE LOW' inserted after pressure.

```
TY SANBA (1216) FCST 48h (1818UTC): 47.9°N 133.1°E ±330 km MOVE NNE 20 kt PRES 996
hPa TOBE LOW MXWD 35 kt GUST 50 kt
```

When the tropical cyclone actually goes into LOW, the text 'became LOW' is inserted. This indeicates that this TC advisory will be the last one for that cyclone.

```
KIROGI (1212) became LOW ANALYSIS (1006UTC): 44.0°N 148.0°E MOVE NNW 30 kt PRES
996 hPa
```

6.2. Examples of description text

6.2.1. Syntax

The syntax of description is similar to headline, but text is a little more natural for human readers. Many keywords are spelled rather than being abbreviated, and each component is delimited by newline than spaces.

6.2.2. Examples

```
TD expected upgrading
ANALYSIS (2006UTC):
Pressure 1006 hPa
at 13.8 degree north 133.4 degree east
position POOR (radius more than 110 km).
Moving west 13 knots.
Max winds 30 knots.
Gust 45 knots.
```

```
TD expected upgrading
Forecast 24 hr (2106UTC):
Pressure 1000 hPa
at 13.8 degree north 131.8 degree east
with 220 km of 70 percent probability circle.
Moving west SLOWLY.
Max winds 35 knots.
Gust 50 knots.
Expected to be TROPICAL STORM.
```

```
TYPHOON MUIFA (1109)
ANALYSIS (0412UTC):
Pressure 945 hPa
at 24.9 degree north 128.6 degree east
position GOOD (radius of 55 km or less).
Moving west SLOWLY.
Max winds 85 knots.
Gust 120 knots.
30 knot wind radius 560 km east 370 km west.
50 knot wind radius 220 km north 170 km south.
```

```
TYPHOON SANBA (1216)
Forecast 48 hr (1818UTC):
Pressure 996 hPa
at 47.9 degree north 133.1 degree east
with 330 km of 70 percent probability circle.
Moving north-north-east 20 knots.
Max winds 35 knots.
Gust 50 knots.
Expected to be EXTRA-TROPICAL LOW.
```

```
KIROGI (1212) became EXTRA-TROPICAL LOW
ANALYSIS (1006UTC):
Pressure 996 hPa
at 44.0 degree north 148.0 degree east
Moving north-north-west 30 knots.
```

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