



Location XML Document Formats

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Wireless Application Protocol
WAP-258-LOCFORM-20010912-a

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1. Scope

Wireless Application Protocol (WAP) is a result of continuous work to define an industry wide specification for developing applications that operate over wireless communication networks. The scope for the WAP Forum is to define a set of specifications to be used by service applications. The wireless market is growing very quickly and reaching new customers and providing new services. To enable operators and manufacturers to meet the challenges in advanced services, differentiation, and fast/flexible service creation, WAP defines a set of protocols in transport, session and application layers. For additional information on the WAP architecture, refer to “*Wireless Application Protocol Architecture Specification*” [WAARCH].

Location based WAP services, i.e. services dependent on a geographical location, represent a class of applications with specific needs. The WAP location framework addresses these needs by providing a transparent and position procedure independent location application interface. It also provides guidelines for location related privacy.

The WAP location framework uses two XML documents, XML Invocation Document and XML Delivery Document, to carry information when location information is requested and delivered. This specification defines the exact format of these documents.

2. References

2.1. Normative References

- [CREQ] “Specification of WAP Conformance Requirements”. WAP Forum™. WAP-221-CREQ-20000915-a. [URL:http://www.wapforum.org/](http://www.wapforum.org/)
- [ISO8601] “Data elements and interchange formats - Information interchange - Representation of dates and times”, International Organization For Standardization (ISO), 15-June-1988
“Data elements and interchange formats - Information interchange - Representation of dates and times, Technical Corrigendum 1”, International Organization For Standardization (ISO) - Technical Committee ISO/TC 154, 01-May-1991
- [LOCPROT] “WAP Location Protocols Specification”, WAP Forum™. WAP-257-LOCPROT-20010912-d. [URL: http://www.wapforum.org/](http://www.wapforum.org/)
- [RFC791] “Internet Protocol”. DARPA. September 1981. [URL: http://www.ietf.org/rfc/rfc791.txt](http://www.ietf.org/rfc/rfc791.txt)
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- [WBXML] “WAP Binary XML Content Format”, WAP Forum™. WAP-192-WBXML-20010725-a. [URL: http://www.wapforum.org/](http://www.wapforum.org/)
- [WGS84] DMA TR 8350.2 Second Edition, 1 September 1991. DMA Technical Report, DOD World Geodetic System 1984, Definition and Relationships with Local Geodetic Systems. [URL: http://www.nima.mil/GandG/pubs.html](http://www.nima.mil/GandG/pubs.html)
- [XML] “Extensible Markup Language (XML)”, W3C Recommendation 10-February-1998, REC-xml-19980210”, T. Bray, et al, February 10, 1998. [URL: http://www.w3.org/TR/REC-xml](http://www.w3.org/TR/REC-xml)

2.2. Informative References

- [EPSG] European Petroleum Standards Group, [URL: http://www.epsg.org](http://www.epsg.org)
- [LOCFW] “WAP Location Framework Overview”. WAP Forum™. WAP-256-LOCFW-20010912-d. [URL: http://www.wapforum.org/](http://www.wapforum.org/)
- [OGIS] Open GIS Consortium, [URL: http://www.opengis.org](http://www.opengis.org)
- [PARLAY] Parlay interface specification, v.2.1. [URL: http://www.parlay.org/specs/index.asp](http://www.parlay.org/specs/index.asp)
- [PUSH-PPG] “Push Proxy Gateway Service Specification”, WAP Forum™, Ltd., WAP-249-PPGService-20010713-a, [URL: http://www.wapforum.org/](http://www.wapforum.org/)
- [WAPARCH] “WAP Architecture”. WAP Forum™. WAP-210-WAPArch-20010712-a. [URL:http://www.wapforum.org/](http://www.wapforum.org/)
- [X.520] ITU-T X.520, Information technology – Open Systems Interconnection – The Directory: Selected attribute types.

2.3. Background Information

The following publications may serve as useful background information on Geodetic Datum and Transformations. They are available through United States Geologic Survey Publications, http://mapping.usgs.gov/esic/to_order.html.

Map Projections – A Working Manual, 1987, stock number “Professional Paper 1395”.

DOD World Geodetic System 1984-- Its Definition and Relationships with Local Geodetic Systems --, 1991, stock number “TR83502WGS84”.

Datum, Ellipsoids, Grids and Grid Reference Systems, 1990, stock number “T83581TEXT”

The Universal Grids: Universal Transverse Mercator (UTM) and Universal Polar Stereographic (UPS), 1989, stock number “T83582”.

3. Terminology and Conventions

3.1. Conventions

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 [RFC2119].

All sections and appendixes, except “Scope” and “Introduction”, are normative, unless they are explicitly indicated to be informative.

3.2. Definitions

Application	An application, in the context of the WAP Location specifications, is the user of location information. An application may execute on a WAP Client or on a web server.
Application Server	An application server, in the context of the WAP Location specifications, is a web server executing an application.
External location entity	Entity in the network or in the terminal that can provide a location as a response to a given request information. External is to be interpreted as not being specified by WAP Forum.
Location information	Information related to a position, including both various location formats (different coordinate systems and datum), and other types of location information such as geo-codes, velocity, altitude, etc.
Position	Coordinates in a reference system.
Position/Location dependent service	Service that is only available within a certain geographical area.
Position/Location based service	Service that uses information about the location of WAPclients.
Terminal	A device that holds the WAP client typically used by a user to request and receive information. Also called a mobile terminal or mobile station.
User	A user is a person that interacts with a user agent to view, hear or otherwise use rendered content.
User Agent	User agent (or content interpreter) is any software or device that interprets WML, WMLScript or other content. This may include textual browsers, voice browsers, search engines, etc.
WAP Client	In the context of push, a WAP Client is a device (or service) that can receive push content from a server. In the context of pull, a WAP Client is a device that can initiate requests to a server for content. In the context of the WAP Location specifications, a WAP Client may include WAP Query functionality or WAP Attachment functionality.
WAP Location Functionality	An entity implementing a WAP location service. A WAP location functionality can be located either in the network - as a server, gateway, proxy, etc. - or in a WAP client. See [LOCFW].

3.3. Abbreviations

DTD	Document Type Definition
GPS	Global Positioning System
GMLC	Gateway Mobile Location Centre

HTTP	Hypertext Transfer Protocol
IANA	Internet Assigned Numbers Authority
IP	Internet Protocol
MLC	Mobile Location Centre
PLMN	Public Land Mobile Network
QoP	Quality of Position
SGML	Standard Generalised Markup Language
UAProf	User Agent Profile
UTC	Universal Time Coordinated
UTM	Universal Transverse Mercator
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
WAP	Wireless Application Protocol
WGS-84	World Geodetic System, 1984
XML	eXtensible Markup Language

4. Introduction

The WAP location framework [LOCFW] and protocol [LOCPROT] specifications define an architecture and related use cases for how location information for a WAP client can be requested by and delivered to applications. The architecture identifies a query service and an attachment service, that support different ways of requesting and delivering location information.

Each service is made up of a set of messages as defined in [LOCPROT]. In the case of the query and attachment services, the messages are encapsulated in two generic XML documents: an XML Invocation Document when a service is invoked, and an XML Delivery Document when location information is delivered. This specification defines the format and the associated DTDs for these two documents.

5. Informative Overview of Invocation and Delivery Documents

5.1. Document Structure

This specification defines two document types - invocation documents and delivery documents.

An invocation document consists of a root element encapsulating one or more request message(s) as defined in [LOCPROT]:

- immediate-query-request
- deferred-query-request
- deferred-stop-request
- attachment-request

Similarly, a delivery document consists of a root element encapsulating one or more answer and report message(s) as defined in [LOCPROT]:

- immediate-query-answer
- deferred-query-answer
- deferred-query-report
- deferred-stop-answer
- attachment-answer

5.2. DTD Structure

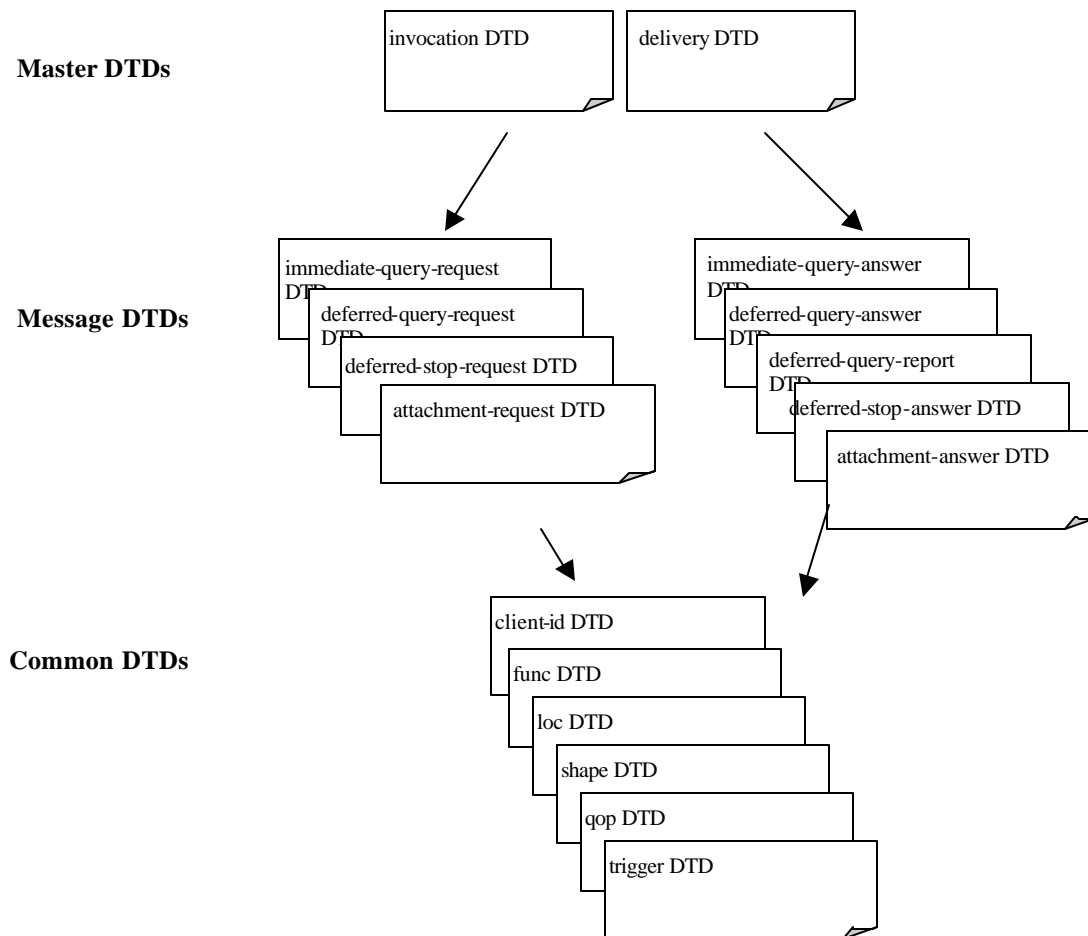


Figure 1. Overview of DTD structure.

The structure of the WAP location XML documents is outlined in the figure above.

Two top level master DTDs are specified - one for invocation documents and one for delivery documents:

- `invocation DTD`
Specifies the root element for invocation documents, and includes the relevant request message DTDs. Applications generating invocation documents only need to include this master DTD.
- `delivery DTD`
Specifies the root element for delivery documents, and includes the relevant answer and report message DTDs. Applications generating delivery documents only need to include this master DTD.

There is one DTD for each message specified in [LOCPROT]:

- Immediate queries:
 - `immediate-query-request DTD` - Immediate Query Request

- `immediate-query-answer` DTD - Immediate Query Answer
- Deferred queries:
 - `deferred-query-request` DTD - Deferred Query Request
 - `deferred-query-answer` DTD - Deferred Query Answer
 - `deferred-query-report` DTD - Deferred Query Report
 - `deferred-stop-request` DTD - Deferred Query, Stop Request
 - `deferred-stop-answer` DTD - Deferred Query, Stop Answer
- Attachment:
 - `attachment-request` DTD - Attachment Request
 - `attachment-answer` DTD - Attachment Answer

Finally, the message DTDs use a set of common DTDs for common element definitions, such as shape and WAP client address elements:

- `client-address` DTD – WAP Client address related elements.
- `func` DTD - Functional elements.
- `loc` DTD - Location related elements.
- `shape` DTD - Shape related elements.
- `qop` DTD - QoP (Quality of Position) related elements.
- `trigger` DTD - Trigger related elements.

5.3. Extensibility

The WAP location documents have been designed with extensibility in mind. Examples of design principles employed to achieve this include:

- Separate DTDs for each message element allows new messages to be added or existing messages to be modified without affecting other elements.
- Separate DTDs for definitions that are common to all messages, e.g. WAP client address and shapes.
- In some cases, e.g. WAP client address or coordinate systems/datum, values are specified as string data together with a small basic vocabulary, instead of enumerating values in the DTD itself. This allows the WAP specifications to specify types and syntax for a small set of common interoperable values in these cases, while making it possible to extend with new values without the need for changing the DTDs. This greatly increases the flexibility of the WAP location specification.

5.4. Internationalisation

The WAP location specification allows some individual element values, e.g. geo-code values such as street addresses, to be encoded in non-ASCII character sets, even if the rest of the document is based on a different encoding. This allows for example Japanese characters to be used in specific elements without having to encode the entire document using Japanese character sets. See 10.4.

5.5. Multiple Invocations/Responses

The invocation and delivery root elements can contain one or more message elements - i.e. it is possible to send multiple request messages in a single invocation document, or receive multiple answer and report messages in a single delivery document. See chapters 11 and 12.

It is also possible to specify multiple WAP client addresses and/or multiple types of location information within a single request message.

5.6. WAP Client Address

This specification specifies the following WAP client addresses (see 22.2.2):

- PLMN - Phone number, e.g. +447968123456
- IPv4 - IP version 4 address, e.g. 123.456.789.123
- IPv6 - IP version 6 address, e.g. ABCD:6785:F65D:56F4:D687:F7DC:372F:F4D5
- PAP-USER - A WAP Push user defined address, e.g.
`john.doe@wapforum.org/TYPE=USER@ppg.carrier.com`

5.7. Types of Location Information

The WAP location specification allows an application to request several different types of location information, such as various coordinates and datum, geo-codes, velocity, direction, etc.

The WAP location specification specifies the following location information that is always supported:

- Latitude and longitude coordinates using the WGS -84 datum [WGS84]

The WAP location specification also specifies the following optional location information:

- UTM coordinates using the WGS -84 datum [WGS84]
- Spatial reference systems

As an alternative to specifying coordinate system and datum, location information can be expressed based on a spatial reference system, such as EPSG:4326 [EPSG]. See 24.2.10.

- Geo-codes

Location information may be requested and returned in terms of geo codes, e.g. postal code, rather than coordinates. See 24.2.5.

- Speed, Altitude, Direction and Heading

In addition to location information, the WAP location specification allows speed, altitude, direction and heading to be requested and provided.

Types of location information are discussed in detail in section 10.7.

5.8. Quality of Position

Quality of position, QoP, can mean any of the following:

- Age of the location information - i.e. when was the information actually collected.
- Accuracy of the location information.
- Confidence in the accuracy information, e.g. “with 65% probability”

Applications may request a certain age or accuracy by specifying constraints in invocations, e.g. “within 50 metres” or “no more than 30 seconds old”. WAP location functionalities may use this information to, for example, select an appropriate location method to use.

WAP location functionalities should try to honour a requested QoP, but may choose not to do so. What QoP is actually provided depends, for example, on available location methods for a particular WAP client at a particular point in time (e.g., a client may be temporarily out of coverage), different billing models and so on.

The WAP location framework allows WAP location functionalities to supply the actual age, accuracy and confidence of the delivered location information (as far as known). It is recommended that applications that depend on a certain quality of position check the actual delivered accuracy.

Quality of position is discussed in detail in section 10.6.

6. Immediate Query Service - Informative Example Documents

6.1. Invocation Examples

6.1.1. Basic Immediate Query Request, Example

The simplest form of an `immediate-query-request` message is shown in the example below, requesting the location of a single WAP client. No specific type of location information is specified, which means location will be returned using latitude/longitude coordinates and the WGS -84 datum (default) [WGS84]. Similarly, no specific constraints on accuracy etc. are specified.

An `immediate-query-request` message in an invocation document may specify a transaction ID, as in this example (see 23.2.7). The value of the transaction ID will be copied into the corresponding `immediate-query-answer` message, allowing applications to link an `immediate-query-answer` message to a specific `immediate-query-request` message.

Next, the application may provide a short description of itself in free text form (see 23.2.1).

After that, the WAP client address is specified. The WAP location specification allows more than one client address in a single request message, though this example only specifies one. Having multiple client addresses in an invocation is equivalent to specifying multiple request messages where all parameters are identical except for the client address.

Since in this example the application has no additional constraints on any specific required location information or quality of position, no more is needed in the invocation. The default information will be used in the answer (latitude/longitude coordinates and WGS -84 datum).

```
<?xml version = "1.0" ?>
<!DOCTYPE invocation PUBLIC
  "-//WAPFORUM//DTD LOC INV 1.0//EN"
  "http://www.wapforum.org/DTD/loc/invocation-1.0.dtd">

<invocation>
  <immediate-query-request>
    <transaction-id>12345@app.acme.com</transaction-id>
    <application>ACME Driving Directions</application>

    <msids>
      <msid msid-type="PLMN">+447968025678</msid>
    </msids>
  </immediate-query-request>
</invocation>
```

6.1.2. Immediate Query Request with Specified Requested Location Information and QoP, Example

This is the same as the previous example, but with the difference that particular location information is requested. The application also requests a specific accuracy of the position.

Requesting specific location information is done through the use of the `geo-info` element (see 24.2.8). In this example, location information is requested in a named spatial reference system.

Applications may request different kinds of location information within the same `geo-info` element. This is equivalent to specifying multiple request messages where all parameters are the same except the requested location information.

Applications can request a certain quality of position (accuracy or maximum age) of the location information using the `qop` element (see 26.2.1). In the example, a horizontal accuracy of 50 metres is requested.

```
<?xml version = "1.0" ?>
<!DOCTYPE invocation PUBLIC
  "-//WAPFORUM//DTD LOC INV 1.0//EN"
  "http://www.wapforum.org/DTD/loc/invocation-1.0.dtd">

<invocation>
  <immediate-query-request>
    <transaction-id>12345@app.acme.com</transaction-id>
    <application>ACME Driving Directions</application>

    <msids>
      <msid msid-type="PLMN">+447968025678</msid>
    </msids>

    <geo-info>
      <ref-sys name="EPSG:4326" />
    </geo-info>
    <qop>
      <hor-acc>50</hor-acc>
    </qop>
  </immediate-query-request>
</invocation>
```

6.1.3. Immediate Query Request for Multiple Types of Requested Location Information, Example

In this example, multiple types of location information are requested: a named spatial reference system, and speed data. The spatial reference system is specified as before using the `geo-info` element, and speed is requested at the same time in the same `geo-info` element. In the example, specific accuracy is also requested for both the position and the speed information using the `qop` element.

```
<?xml version = "1.0" ?>
<!DOCTYPE invocation PUBLIC
  "-//WAPFORUM//DTD LOC INV 1.0//EN"
  "http://www.wapforum.org/DTD/loc/invocation-1.0.dtd">

<invocation>
  <immediate-query-request>
    <transaction-id>12345@app.acme.com</transaction-id>
    <application>ACME Driving Directions</application>

    <msids>
      <msid msid-type="PLMN">+447968025678</msid>
    </msids>

    <geo-info>
      <ref-sys name="EPSG:4326" />
      <speed/>
    </geo-info>
```

```

    <qop>
      <hor-acc>50</hor-acc>
      <speed-acc>25</speed-acc>
    </qop>
  </immediate-query-request>
</invocation>

```

6.1.4. Immediate Query Request with Requested Maximum Age of Location Information, Example

Applications may request a certain maximum age of the location information by using the `maxage` element (see 26.2.1) within the `qop` element, as indicated in the following example. The requested maximum age is specified in seconds.

```

<?xml version = "1.0" ?>
<!DOCTYPE invocation PUBLIC
  "-//WAPFORUM//DTD LOC INV 1.0//EN"
  "http://www.wapforum.org/DTD/loc/invocation-1.0.dtd">

<invocation>
  <immediate-query-request>
    <transaction-id>12345@app.acme.com</transaction-id>
    <application>ACME Driving Directions</application>

    <msids>
      <msid msid-type="PLMN">+447968025678</msid>
    </msids>

    <qop>
      <maxage>30</maxage>
      <hor-acc>50</hor-acc>
    </qop>
  </immediate-query-request>
</invocation>

```

6.2. Delivery Examples

6.2.1. Immediate Query Answer with Accuracy Circle, Example

The following is an example of a basic `immediate-query-answer` message.

Each `immediate-query-answer` message within a delivery document may contain a `transaction-id` element. If a `transaction-id` was specified in the corresponding request, then the `transaction-id` in the `immediate-query-answer` message will have the same value as the `transaction-id` that was specified in the corresponding request. The `transaction-id` may be used, for example, by applications to link an answer message to a particular request message.

In the case of immediate queries, each answer message contains one or more `pos` elements (see 24.2.1), each carrying location information or error responses for a single WAP client. In this example, only location information for a single client was requested, so there is only a single `pos` element. If the location of more than one client was requested, then the answer message would contain a `pos` element for each client.

The `pos` element contains an `msid` element, identifying the address of the located WAP client. The address is returned in the same format as in the corresponding request.

If the location request was successful (an error example is shown later), the `pos` element will contain a `pd` element (see 24.2.2) defining the actual location, and any related quality of position information. Note that while requested accuracy is indicated in requests with the `hor-acc` element, the resulting accuracy is specified with a `shape` (in this example, a circle with the position as the centre point and the radius indicating accuracy).

A time stamp (if known) is specified in the `pd` element. The time stamp is the time when the WAP client position was originally obtained. Any location information, as well as any accuracy data, is provided as determined when the location information was originally obtained.

```
<?xml version = "1.0" ?>
<!DOCTYPE delivery PUBLIC
  "-//WAPFORUM//DTD LOC DEL 1.0//EN"
  "http://www.wapforum.org/DTD/loc/delivery-1.0.dtd">

<delivery>
  <immediate-query-answer>
    <transaction-id>12345@app.acme.com</transaction-id>
    <pos>
      <msid msid-type="PLMN">+447968025678</msid>
      <pd>
        <time utc-off="+0200">2000-06-23T13:44:53Z</time>
        <coord-datum coord-sys="LL" datum="WGS-84"/>
        <shape>
          <circle>
            <point>
              <ll-point>
                <lat>30.347692</lat>
                <long>45.437628</long>
              </ll-point>
            </point>
            <rad>240</rad>
          </circle>
        </shape>
      </pd>
    </pos>
  </immediate-query-answer>
</delivery>
```

6.2.2. Immediate Query Answer without Accuracy, Example

This is the same as the basic example of the previous section, but without accuracy information (i.e. accuracy unknown). In this case, the position is returned as a point, rather than a circle with an accuracy radius.

```
<?xml version = "1.0" ?>
<!DOCTYPE delivery PUBLIC
  "-//WAPFORUM//DTD LOC DEL 1.0//EN"
  "http://www.wapforum.org/DTD/loc/delivery-1.0.dtd">

<delivery>
  <immediate-query-answer>
    <transaction-id>12345@app.acme.com</transaction-id>
    <pos>
      <msid msid-type="PLMN">+447968025678</msid>
      <pd>
        <time utc-off="+0200">2000-06-23T13:44:53Z</time>
        <coord-datum coord-sys="LL" datum="WGS-84"/>
        <shape>
```

```

        <point>
          <ll-point>
            <lat>30.347692</lat>
            <long>45.437628</long>
          </ll-point>
        </point>
      </shape>
    </pd>
  </pos>
</immediate-query-answer>
</delivery>

```

6.2.3. Immediate Query Answer with Multiple Types of Location Information, Example

In this example, multiple types of location information were requested for a single WAP client: a named spatial reference system, and the current speed. Both types of information are returned in the same pd element (implying the time stamp applies to both values).

```

<?xml version = "1.0" ?>
<!DOCTYPE delivery PUBLIC
  "-//WAPFORUM//DTD LOC DEL 1.0//EN"
  "http://www.wapforum.org/DTD/loc/delivery-1.0.dtd">

<delivery>
  <immediate-query-answer>
    <transaction-id>12345@app.acme.com</transaction-id>
    <pos>
      <msid msid-type="PLMN">+447968025678</msid>
      <pd>
        <time utc-off="+0200">2000-06-23T13:44:53Z</time>
        <coord-datum coord-sys="LL" datum="WGS-84"/>
        <shape>
          <circle>
            <point>
              <ll-point>
                <lat>30.347692</lat>
                <long>45.437628</long>
              </ll-point>
            </point>
            <rad>240</rad>
          </circle>
        </shape>
        <speed>25.6</speed>
        <speed-acc>5</speed-acc>
      </pd>
    </pos>
  </immediate-query-answer>
</delivery>

```

6.2.4. Immediate Query Answer for Multiple WAP clients, Example

In this example, location information was requested for multiple WAP clients. In the case of immediate queries, the answer message will contain one pos element for each client.


```

<?xml version = "1.0" ?>
<!DOCTYPE delivery PUBLIC
  "-//WAPFORUM//DTD LOC DEL 1.0//EN"
  "http://www.wapforum.org/DTD/loc/delivery-1.0.dtd">

<delivery>
  <immediate-query-answer>
    <transaction-id>12345@app.acme.com</transaction-id>
    <pos>
      <msid msid-type="PLMN">+447968025678</msid>
      <pd>
        <time utc-off="+0200">2000-06-23T13:44:53Z</time>
        <coord-datum coord-sys="LL" datum="WGS-84"/>
        <shape>
          <circle>
            <point>
              <ll-point>
                <lat>30.347692</lat>
                <long>45.437628</long>
              </ll-point>
            </point>
            <rad>240</rad>
          </circle>
        </shape>
      </pd>
    </pos>

    <pos>
      <msid msid-type="PLMN">+447968025679</msid>
      <pd>
        <time utc-off="+0200">2000-06-23T13:45:20Z</time>
        <coord-datum coord-sys="LL" datum="WGS-84"/>
        <shape>
          <circle>
            <point>
              <ll-point>
                <lat>31.846732</lat>
                <long>46.737542</long>
              </ll-point>
            </point>
            <rad>240</rad>
          </circle>
        </shape>
      </pd>
    </pos>
  </immediate-query-answer>
</delivery>

```

6.2.5. Immediate Query Answer with an Error Response, Example

An error response is similar in structure to a successful response. The difference is that the `pos` element contains a `poserr` element (see 23.2.2) rather than a `pd` element. The time stamp in this case is the time when the error response was generated.

```

<?xml version = "1.0" ?>
<!DOCTYPE delivery PUBLIC
  "-//WAPFORUM//DTD LOC DEL 1.0//EN"

```

```

"http://www.wapforum.org/DTD/loc/delivery-1.0.dtd">
<delivery>
  <immediate-query-answer>
    <transaction-id>12345@app.acme.com</transaction-id>
    <pos>
      <msid msid-type="PLMN">+447968025678</msid>
      <poserr>
        <result resid="4">UNKNOWN SUBSCRIBER</result>
        <time utc-off="+0200">2000-06-23T13:44:54Z</time>
      </poserr>
    </pos>
  </immediate-query-answer>
</delivery>

```

Note that an answer message may contain one or more `pos` elements - each one of which may contain both location information and error responses. For example, if location information was requested for two WAP clients, then it is possible in the response to get information for one of the clients, and an error message (e.g. information not available, or information denied or similar) for the other.

Example:

```

<?xml version = "1.0" ?>
<!DOCTYPE delivery PUBLIC
  "-//WAPFORUM//DTD LOC DEL 1.0//EN"
  "http://www.wapforum.org/DTD/loc/delivery-1.0.dtd">
<delivery>
  <immediate-query-answer>
    <transaction-id>12345@app.acme.com</transaction-id>
    <pos>
      <msid msid-type="PLMN">+447968025678</msid>
      <poserr>
        <result resid="4">UNKNOWN SUBSCRIBER</result>
        <time utc-off="+0200">2000-06-23T13:44:54Z</time>
      </poserr>
    </pos>
    <pos>
      <msid msid-type="PLMN">+447968025679</msid>
      <pd>
        <time utc-off="+0200">2000-06-23T13:44:53Z</time>
        <coord-datum coord-sys="LL" datum="WGS-84"/>
        <shape>
          <circle>
            <point>
              <ll-point>
                <lat>30.347692</lat>
                <long>45.437628</long>
              </ll-point>
            </point>
            <rad>240</rad>
          </circle>
        </shape>
      </pd>
    </pos>
  </immediate-query-answer>
</delivery>

```


7. Deferred Query Service - Informative Example Documents

7.1. Deferred Query Request, Example

The basic form of a `deferred-query-request` message is shown in the following example.

As in the case of immediate queries, a transaction ID (see 23.2.7) may be specified. In the case of deferred queries, it may be used to link `deferred-query-answer` and `deferred-query-report` messages to a specific `deferred-query-request` message, and is also used to stop further reporting (e.g. to stop periodic reports).

Also, as in the case of immediate queries, the application may provide a short description of itself in free text form. After that, the WAP client address is specified.

In the case of deferred query requests, a recipient address must be specified. The recipient is the resource that will receive location reports, specified by a URI.

In this example, the default location information will be provided in the delivery - other types of location information and specific QoP may be specified by applications in the same way as in the case of immediate queries (see examples in chapter 6).

Next follows the trigger condition for the deferred query. All deferred queries must specify a trigger for when the report should occur, in this case a periodic trigger with an interval of 60 minutes. The WAP location specification also specifies a one-shot trigger, allowing a single report at a specified point in time.

```
<?xml version = "1.0" ?>
<!DOCTYPE invocation PUBLIC
  "-//WAPFORUM//DTD LOC INV 1.0//EN"
  "http://www.wapforum.org/DTD/loc/invocation-1.0.dtd">

<invocation>
  <deferred-query-request>
    <transaction-id>12345@app.acme.com</transaction-id>
    <application>ACME Driving Directions</application>
    <msids>
      <msid msid-type="PLMN">+447968025678</msid>
    </msids>
    <recipient-addr>
      http://www.app.com/cgi-bin/getloc.cgi
    </recipient-addr>
    <periodic-trigger>
      <interval>3600</interval>
      <start-time utc-off="+0200">2000-06-23T13:44:00Z</start-time>
      <stop-time utc-off="+0200">2000-06-23T15:44:00Z</stop-time>
    </periodic-trigger>
  </deferred-query-request>
</invocation>
```

7.2. Deferred Query Answer, Example

A `deferred-query-answer` message just contains a result code, indicating if the associated `deferred-query-request` message was successful or not (accepted or not). If a transaction ID was defined in the associated request, then the value will be copied to the answer message.

```

<?xml version = "1.0" ?>
<!DOCTYPE delivery PUBLIC
  "-//WAPFORUM//DTD LOC DEL 1.0//EN"
  "http://www.wapforum.org/DTD/loc/delivery-1.0.dtd">

<delivery>
  <deferred-query-answer>
    <transaction-id>12345@app.acme.com</transaction-id>
    <msid msid-type="PLMN">+447968025678</msid>
    <result resid="0">OK</result>
  </deferred-query-answer>
</delivery>

```

7.3. Deferred Query Report, Example

A deferred query report follows the same basic form as an immediate query answer (see chapter 6). In this example, a level of confidence for the accuracy information is also indicated (in per cent), using the `lev-conf` element. For example:

```

<?xml version = "1.0" ?>
<!DOCTYPE delivery PUBLIC
  "-//WAPFORUM//DTD LOC DEL 1.0//EN"
  "http://www.wapforum.org/DTD/loc/delivery-1.0.dtd">

<delivery>
  <deferred-query-report>
    <transaction-id>12345@app.acme.com</transaction-id>
    <pos>
      <msid msid-type="PLMN">+447968025678</msid>
      <pd>
        <time utc-off="+0200">2000-06-23T13:44:53Z</time>
        <coord-datum coord-sys="LL" datum="WGS-84"/>
        <shape>
          <circle>
            <point>
              <ll-point>
                <lat>30.347692</lat>
                <long>45.437628</long>
              </ll-point>
            </point>
            <rad>240</rad>
          </circle>
        </shape>
        <lev-conf>67</lev-conf>
      </pd>
    </pos>
  </deferred-query-report>
</delivery>

```

7.4. Cancellation Examples

7.4.1. Deferred Stop Request, Example

To cancel a deferred query, e.g. stop a periodic trigger, a `deferred-stop-request` message can be sent to the WAP location query functionality. To identify what is to be cancelled, the application must supply the `transaction-id` used in the corresponding `deferred-query-request` message. All reporting associated with the given `transaction-id` is cancelled. For example, if a cancelled request message concerned multiple WAP clients, then all reporting for all those clients will cease.

```
<?xml version = "1.0" ?>
<!DOCTYPE invocation PUBLIC
  "-//WAPFORUM//DTD LOC INV 1.0//EN"
  "http://www.wapforum.org/DTD/loc/invocation-1.0.dtd">

<invocation>
  <deferred-stop-request>
    <transaction-id>12345@app.acme.com</transaction-id>
  </deferred-stop-request>
</invocation>
```

7.4.2. Deferred Stop Answer, Example

A deferred-stop-answer message just contains the transaction id of the cancelled deferred-query-request message, and a result code.

```
<?xml version = "1.0" ?>
<!DOCTYPE delivery PUBLIC
  "-//WAPFORUM//DTD LOC DEL 1.0//EN"
  "http://www.wapforum.org/DTD/loc/delivery-1.0.dtd">

<delivery>
  <deferred-stop-answer>
    <transaction-id>12345@app.acme.com</transaction-id>
    <result resid="0">OK</result>
  </deferred-stop-answer>
</delivery>
```

8. Attachment Service – Informative Example Documents

8.1. Attachment Request, Example

The basic form of an `attachment-request` message is shown in the following example.

The main difference compared to immediate and deferred queries is that no WAP client address is specified. A client address is not needed in the attachment case, since the client is uniquely defined by the underlying session at the HTTP level. See [LOCFW] and [LOCROT].

In this example, no transaction ID is used, although it can be added and used in the same way as in the previous immediate query and deferred query examples.

The default location information will be provided in the delivery in this example - other types of location information and specific QoP may be specified by applications in the same way as in the case of immediate queries (see examples in chapter 6).

```
<?xml version = "1.0" ?>
<!DOCTYPE invocation PUBLIC
  "-//WAPFORUM//DTD LOC INV 1.0//EN"
  "http://www.wapforum.org/DTD/loc/invocation-1.0.dtd">

<invocation>
  <attachment-request>
    <application>ACME Driving Directions</application>
  </attachment-request>
</invocation>
```

8.2. Attachment Answer, Example

An `attachment-answer` message follows the same basic form as an `immediate-query-answer` message (see chapter 6). The only difference is that the WAP client address is not included. Each `attachment-answer` message only concerns a single client, but it may still contain, for example, multiple types of location information.

```
<?xml version = "1.0" ?>
<!DOCTYPE delivery PUBLIC
  "-//WAPFORUM//DTD LOC DEL 1.0//EN"
  "http://www.wapforum.org/DTD/loc/delivery-1.0.dtd">

<delivery>
  <attachment-answer>
    <pos>
      <pd>
        <time utc-off="+0200">2000-06-23T13:44:53Z</time>
        <coord-datum coord-sys="LL" datum="WGS-84"/>
        <shape>
          <circle>
            <point>
              <ll-point>
                <lat>30.347692</lat>
                <long>45.437628</long>
              </ll-point>
            </point>
            <rad>240</rad>
          </circle>
        </shape>
      </pd>
    </pos>
  </attachment-answer>
</delivery>
```

```
</pd>  
</pos>  
</attachment-answer>  
</delivery>
```


9. Informative Combination Examples

Services and messages may be combined in various ways in invocation and delivery documents. This chapter shows examples of how this can work.

9.1. Combined Immediate and Deferred Requests, Example

9.1.1. Scenario

Various messages can be mixed within a single invocation and response document as shown in this example. The assumed sequence for this example is as follows:

1. The application sends an invocation document containing the following messages:
 - One `immediate-query-request` message requesting the location of two WAP clients.
 - One `deferred-query-request` message requesting periodic updates for one WAP client (no stop time specified - instead the updates are cancelled later with a `deferred-stop-request` message).
2. An initial delivery document is returned containing the following messages:
 - One `immediate-query-answer` message containing the location information for the two WAP clients in the immediate query.
 - One `deferred-query-answer` message containing an acknowledgement of the deferred request.
3. Periodic delivery documents are sent to the application. Each of those delivery documents contains a single `deferred-query-report` message.
4. The application stops the periodic reporting by sending an invocation document containing a `deferred-stop-request` message.
5. A delivery document containing a `deferred-stop-answer` message is returned to the application. The periodic reporting is cancelled.

The following sections detail the documents in each case.

9.1.2. Initial Invocation Document

```
<?xml version = "1.0" ?>
<!DOCTYPE invocation PUBLIC
  "-//WAPFORUM//DTD LOC INV 1.0//EN"
  "http://www.wapforum.org/DTD/loc/invocation-1.0.dtd">

<invocation>
  <immediate-query-request>
    <transaction-id>12345@app.acme.com</transaction-id>
    <application>ACME Driving Directions</application>

    <msids>
      <msid msid-type="PLMN">+447968025678</msid>
      <msid msid-type="PLMN">+447968025679</msid>
    </msids>
  </immediate-query-request>
```

```

<deferred-query-request>
  <transaction-id>67890@app.acme.com</transaction-id>
  <application>ACME Driving Directions</application>
  <msids>
    <msid msid-type="PLMN">+447968025680</msid>
  </msids>
  <recipient-addr>
    http://www.app.com/cgi-bin/getloc.cgi
  </recipient-addr>
  <periodic-trigger>
    <interval>3600</interval>
  </periodic-trigger>
</deferred-query-request>
</invocation>

```

9.1.3. Initial Delivery Document

```

<?xml version = "1.0" ?>
<!DOCTYPE delivery PUBLIC
  "-//WAPFORUM//DTD LOC DEL 1.0//EN"
  "http://www.wapforum.org/DTD/loc/delivery-1.0.dtd">

<delivery>
  <immediate-query-answer>
    <transaction-id>12345@app.acme.com</transaction-id>
    <pos>
      <msid msid-type="PLMN">+447968025678</msid>
      <pd>
        <time utc-off="+0200">2000-06-23T13:44:53Z</time>
        <coord-datum coord-sys="LL" datum="WGS-84"/>
        <shape>
          <circle>
            <point>
              <ll-point>
                <lat>30.347692</lat>
                <long>45.437628</long>
              </ll-point>
            </point>
            <rad>240</rad>
          </circle>
        </shape>
      </pd>
    </pos>

    <pos>
      <msid msid-type="PLMN">+447968025679</msid>
      <pd>
        <time utc-off="+0200">2000-06-23T13:45:20Z</time>
        <coord-datum coord-sys="LL" datum="WGS-84"/>
        <shape>
          <circle>
            <point>
              <ll-point>
                <lat>31.876359</lat>
                <long>46.763872</long>
              </ll-point>
            </point>
          </circle>
        </shape>
      </pd>
    </pos>
  </immediate-query-answer>
</delivery>

```

```

        <rad>240</rad>
      </circle>
    </shape>
  </pd>
</pos>
</immediate-query-answer>

<deferred-query-answer>
  <transaction-id>67890@app.acme.com</transaction-id>
  <msid msid-type="PLMN">+447968025680</msid>
  <result resid="0">OK</result>
</deferred-query-answer>
</delivery>

```

9.1.4. Delivery Document with Report

```

<?xml version = "1.0" ?>
<!DOCTYPE delivery PUBLIC
  "-//WAPFORUM//DTD LOC DEL 1.0//EN"
  "http://www.wapforum.org/DTD/loc/delivery-1.0.dtd">

<delivery>
  <deferred-query-report>
    <transaction-id>67890@app.acme.com</transaction-id>
    <pos>
      <msid msid-type="PLMN">+447968025680</msid>
      <pd>
        <time utc-off="+0200">2000-06-23T13:58:31Z</time>
        <coord-datum coord-sys="LL" datum="WGS-84"/>
        <shape>
          <circle>
            <point>
              <ll-point>
                <lat>33.847692</lat>
                <long>48.237628</long>
              </ll-point>
            </point>
            <rad>240</rad>
          </circle>
        </shape>
      </pd>
    </pos>
  </deferred-query-report>
</delivery>

```

9.1.5. Stop Request, Invocation Document

```

<?xml version = "1.0" ?>
<!DOCTYPE invocation PUBLIC
  "-//WAPFORUM//DTD LOC INV 1.0//EN"
  "http://www.wapforum.org/DTD/loc/invocation-1.0.dtd">

<invocation>
  <deferred-stop-request>
    <transaction-id>67890@app.acme.com</transaction-id>
  </deferred-stop-request>
</invocation>

```

9.1.6. Stop Answer, Delivery Document

```
<?xml version = "1.0" ?>
<!DOCTYPE delivery PUBLIC
  "-//WAPFORUM//DTD LOC DEL 1.0//EN"
  "http://www.wapforum.org/DTD/loc/delivery-1.0.dtd">

<delivery>
  <deferred-stop-answer>
    <transaction-id>67890@app.acme.com</transaction-id>
    <result resid="0">OK</result>
  </deferred-stop-answer>
</delivery>
```

10. Normative General Behaviour

10.1. Parsing of DTDs

WAP location functionalities **MUST** be able to parse all well formed location XML documents.

Although certain elements are used only for optional functionality, all implementations **MUST** still be able to parse any well formed location XML document and respond with an appropriate error code if necessary.

For example, an implementation supporting only the immediate query service, must still be able to parse a deferred query request and respond that the service is not supported.

10.2. Version Handling of DTDs

The version of an Invocation or Delivery document **MUST** be given in the DOCTYPE header as follows:

For Invocation documents:

```
<!DOCTYPE invocation PUBLIC
  "-//WAPFORUM//DTD LOC INV 1.0//EN"
  "http://www.wapforum.org/DTD/loc/invocation-1.0.dtd">
```

For Delivery documents:

```
<!DOCTYPE delivery PUBLIC
  "-//WAPFORUM//DTD LOC DEL 1.0//EN"
  "http://www.wapforum.org/DTD/loc/delivery-1.0.dtd">
```

Version numbers are specified as <major.minor>.

If a WAP Location functionality receives an Invocation document with a major version number which it does not support, then it **MUST** return the error code "UNSUPPORTED VERSION" (see 23.2.5).

If a WAP Location functionality receives an Invocation document with a supported major number and a minor version number which it does not support, then it **MUST** ignore any unknown elements and attributes within the document, or return the error code "UNSUPPORTED VERSION" (see 23.2.5)

10.3. Invalid Values

This specification specifies valid values and ranges for most elements and attributes in request messages. If an application supplies any value beyond such constraints - e.g. a negative requested accuracy - then the WAP location functionality **SHOULD** return the error code "SYNTAX ERROR" (see 23.2.5).

10.4. Internationalisation

In order to support internationalisation, e.g. to support Japanese character sets, the WAP location specification allows some individual element values, e.g. geo-code values such as street addresses, to be encoded in a different character set than the base character set of the document (as specified by the DOCTYPE XML prologue). A WAP location functionality residing in the WAP location network **MUST** support this. A WAP location functionality residing in the WAP Client **MAY** support this.

Elements supporting the latter mechanism, e.g. geo-code, include an encoding attribute specifying the character set for the element value. If a specific character set is specified that is different than the base character set of the document (as specified by the DOCTYPE XML prologue), then the value **MUST** be base 64 encoded. If no specific

character set is specified for the element, i.e. if the `encoding` attribute is not used, then the base character set of the document (as specified by the DOCTYPE XML prologue) MUST be assumed.

In the `encoding` attribute, the values "UTF-8", "UTF-16", "ISO-10646-UCS-2", and "ISO-10646-UCS-4" SHOULD be used for the various encodings and transformations of Unicode / ISO/IEC 10646, the values "ISO-8859-1", "ISO-8859-2", ... "ISO-8859-*n*" (where *n* is the part number) SHOULD be used for the parts of ISO 8859, and the values "ISO-2022-JP", "Shift_JIS", and "EUC-JP" SHOULD be used for the various encoded forms of JIS X-0208-1997. It is recommended that character encodings registered (as *charsets*) with the Internet Assigned Numbers Authority, other than those just listed, be referred to using their registered names; other encodings should use names starting with an "x-" prefix.

Example:

```
<geo-code type="street-address" encoding="ISO-2022-JP">
  Asd6f3hJHEgJl45kBc94jEN35h19ab94rHd40jd9j3h4gSNcK4n5
</geo-code>
```

10.5. Transaction ID

Applications may specify a transaction ID in any request message. A transaction ID can be used to link an answer or report message to a particular request, or to cancel for example periodic reporting.

If a transaction ID is specified in a request, then WAP location functionalities MUST copy its value to any resulting answer and report messages. If no transaction ID is specified in a request, or if there is no associated request message, then a transaction-id need not be specified in the answer or report message.

If a deferred request message contains the same transaction ID as a previously received and uncompleted request message, then each message MUST be processed independently using the same transaction ID.

To be able to use the stop request, applications must specify a transaction ID in the original request.

The value of the transaction id is a free textual form, and its format is left completely up to applications. However, in order to avoid conflicts, the WAP location specification recommends that applications use an address (e.g. a URL) within their control combined with an identifier for the request. For example: "www.wapforum.org/123" or "123@wapforum.org".

10.6. QoP

Quality of position, QoP, can mean either of the following:

- Age of the location information - i.e. when was the information actually collected.
- Accuracy of the location information (a system estimation).
- Confidence in the accuracy information, e.g. "with 65% probability"

10.6.1. Quality of Position in Request Messages

Age of location information:

Applications may specify a requested maximum age using the `maxage` element in a request message (see 26.2.1). This information may be used by WAP location functionalities to, for example, select an appropriate location method.

Accuracy of location information:

Applications may specify a requested accuracy using the `qop` element in a request message (see 26.2.1). This information may be used by WAP location functionalities to, for example, select an appropriate location method.

Requested quality of position cannot be provided:

The behaviour of the WAP location functionality when a requested quality of position cannot be provided can be controlled by applications through the optional `must-be-satisfied` attribute of the `qop` element (26.2.1):

1. If an application does not specify the requested quality of position as required, then the WAP location functionality **SHOULD** make a best effort, and indicate the actual provided quality of position in the response. This is the default behaviour.
2. Applications may specify that the requested quality of position is required. In this case, the WAP location functionality **MUST** return an error message (see 23.2.5) if the requested quality of position cannot be provided.

This attribute covers all requested quality of position in a `qop` element. For example, if both a specific horizontal accuracy and a speed accuracy were specified in the same `qop` element, and the application specified the quality as required, then the WAP location functionality must return an error message unless both the requested horizontal accuracy and the requested speed accuracy can be provided.

10.6.2. Quality of Position in Answer and Report Messages

Maximum age of location information:

1. The maximum age of delivered location information **MUST** be indicated in answer and report messages (unless unknown), through a time stamp. The time stamp **MUST** specify the time when the location information was originally determined.
2. If no specific maximum age is specified in the request message, then the maximum age of the delivered location information is up to the WAP location functionality (e.g., it can do a best effort, use the most efficient location method, use cached data, etc.). The age of the delivered information **MUST** still be indicated through the time stamp (unless unknown).
3. Depending on what is available, the actual delivered maximum age **MAY** be larger than the requested maximum age. It is recommended that applications check the time stamp of the delivered location information, if the age of the location information is important.

Accuracy of location information:

1. Any delivered accuracy information **MUST** relate to the point in time when the location information was originally determined, as specified by the time stamp.
2. If no specific accuracy was requested, then the accuracy of the delivered location information is up to the WAP location functionality (e.g., it can do a best effort, use the most efficient or the most accurate location method, etc.). The WAP location functionality **MUST** return accuracy information in the response to indicate the actual delivered accuracy (unless unknown).
3. Depending on what is available, the actual delivered accuracy **MAY** be less than the requested accuracy. If accuracy is important, it is recommended that applications check the actual accuracy of the delivered location information.
4. If a specific accuracy is requested, then the corresponding location information **MUST** be provided as well, even when the corresponding location information was not explicitly requested (unless unknown, in which case an error code **MUST** be returned). For example, if speed accuracy was requested in the `qop` element, but speed information was not requested in the `geo-info` element, then speed information should be returned anyway.

Confidence of accuracy information:

A WAP location functionality MAY indicate a confidence level for delivered accuracy information, e.g. “with 65% confidence”. The level of confidence is indicated in answer and report messages using the `lev-conf` element (see 26.2.8). If no `lev-conf` element is present in an answer or report message, then the level of confidence is unspecified.

The level of confidence applies to all accuracy elements within a `pd` element (see 24.2.2).

10.7. Types of Location Information

The WAP location specification allows an application to request several different types of location information, such as various coordinates and datum, geo-codes, speed, direction, etc.

All implementations of the WAP location services MUST support the following location information:

- Latitude/longitude coordinates using the WGS -84 datum [WGS84].

Implementations MAY support:

- UTM coordinates using the WGS -84 datum [WGS84]
- Spatial reference systems
- geo-codes (e.g. postal code, street name)
- speed
- direction
- heading
- altitude

10.7.1. Location Information in Request Messages

Applications may request specific types of location information, including for example speed and direction, by including a `geo-info` element in request messages (see 24.2.8).

10.7.2. Location Information in Answer and Report Messages

1. If no specific location information was requested in a corresponding request message, then the WAP location functionality MUST return latitude/longitude coordinates in the WGS -84 datum [WGS84].
2. If the application specified one or more types of location information in the request message, then only that information SHOULD be returned.
3. If a requested type of location information cannot be provided, then an error MUST be returned for that information. An error SHOULD only be returned for the unsupported information. For example, if an application requested coordinates and speed, but only coordinates could be provided, then the WAP location functionality should return coordinate information, and error information for the speed.

10.8. Priority

Applications may specify a requested priority by including a `prio` element in request messages (23.2.3).

It is up to the receiving WAP location functionality what actual priority is given to any particular request. A requested priority SHOULD be honoured if possible.

If a specific priority is not specified in a request message (no `prio` element is included), it defaults to 'normal'.

11. Invocation DTD

11.1. Overview

This DTD only specifies a single element, the `invocation` element, which is the root element for all invocation documents. It also includes all other relevant DTDs, so applications need only use this DTD when using request messages.

An invocation document **MAY** contain more than one request message. WAP clients **MAY** only support a single message in an invocation document, while location functionalities in the WAP location network **MUST** support more than one message in an invocation document.

Request messages **MUST** only be mixed as follows within a single invocation document:

1. `immediate-query-request`, `deferred-query-request` and `deferred-stop-request` **MAY** all be present in the same invocation document. There **MAY** be more than one message of each type.
2. `attachment-request` **MUST** only be present by itself in an invocation document. There **MAY** be more than one `attachment-request` messages within a single invocation document.

11.2. Description of Elements

11.2.1. invocation

```
<!ELEMENT invocation (immediate-query-request |
                      deferred-query-request |
                      deferred-stop-request |
                      attachment-request)+>
```

The `invocation` element is the root element for invocation documents. It may contain any number of request messages (combined as defined above).

11.3. Document Identifiers

11.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC INV 1.0//EN"
```

11.4. DTD

```
<!-- -->
<!-- Include message DTDs -->
<!-- -->

<!ENTITY % locimmreq PUBLIC
  "-//WAPFORUM//DTD LOC IMM REQ 1.0//EN"
  "http://www.wapforum.org/DTD/immediate-query-request_1.0.dtd">
%locimmreq;

<!ENTITY % locdefreq PUBLIC
  "-//WAPFORUM //DTD LOC DEF REQ 1.0//EN"
  "http://www.wapforum.org/DTD/deferred-query-request_1.0.dtd">
%locdefreq;
```

```

<!ENTITY % locdefstopreq PUBLIC
  "-//WAPFORUM//DTD LOC DEF STOP REQ 1.0//EN"
  "http://www.wapforum.org/DTD/deferred-stop-request_1.0.dtd">
%locdefstopreq;

<!ENTITY % locattreq PUBLIC
  "-//WAPFORUM//DTD LOC ATT REQ 1.0//EN"
  "http://www.wapforum.org/DTD/attachment-request_1.0.dtd">
%locattreq;

<!ENTITY % loc PUBLIC
  "-//WAPFORUM//DTD LOC LOC 1.0//EN"
  "http://www.wapforum.org/DTD/loc_1.0.dtd">
%loc;

<!ENTITY % func PUBLIC
  "-//WAPFORUM//DTD LOC FUNC 1.0//EN"
  "http://www.wapforum.org/DTD/func_1.0.dtd">
%func;

<!ENTITY % qop PUBLIC
  "-//WAPFORUM//DTD LOC QOP 1.0//EN"
  "http://www.wapforum.org/DTD/qop_1.0.dtd">
%qop;

<!ENTITY % shape PUBLIC
  "-//WAPFORUM//DTD LOC SHAPE 1.0//EN"
  "http://www.wapforum.org/DTD/shape_1.0.dtd">
%shape;

<!ENTITY % clientaddress PUBLIC
  "-//WAPFORUM//DTD LOC CLIENT ADDRESS 1.0//EN"
  "http://www.wapforum.org/DTD/client-address_1.0.dtd">
%clientaddress;

<!ENTITY % trigger PUBLIC
  "-//WAPFORUM//DTD LOC TRIGGER 1.0//EN"
  "http://www.wapforum.org/DTD/trigger_1.0.dtd">
%trigger;

<!--          -->
<!-- Definitions          -->
<!--          -->

<!ELEMENT invocation (immediate-query-request |
  deferred-query-request |
  deferred-stop-request |
  attachment-request)+>

```

12. Delivery DTD

12.1. Overview

This DTD only specifies a single element, the `delivery` element, which is the root element for all delivery documents. It also includes all other relevant DTDs, so applications need only use this DTD when using answer and report messages.

A delivery document **MAY** contain more than one answer or report message.

Answer and report messages **MUST** only be mixed as follows within a single delivery document:

1. `immediate-query-answer`, `deferred-query-answer`, and `deferred-stop-answer` **MAY** all be present in the same delivery document. There **MAY** be more than one message of each type.
2. `deferred-query-report` **MUST NOT** be mixed with any other message. A delivery document **MUST** only contain a single `deferred-query-report` message.
3. `attachment-answer` messages **MUST NOT** be mixed with any other messages. There **MAY** be more than one `attachment-answer` message within a single delivery document.

12.2. Description of Elements

12.2.1. delivery

```
<!ELEMENT delivery (immediate-query-answer |
                    deferred-query-answer |
                    deferred-query-report |
                    deferred-stop-answer |
                    attachment-answer)+>
```

The `delivery` element is the root element for delivery documents. It may contain any number of answer and report messages.

12.3. Document Identifiers

12.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC DEL 1.0//EN"
```

12.4. DTD

```
<!-- -->
<!-- Include message DTDs -->
<!-- -->

<!ENTITY % locimmans PUBLIC
  "-//WAPFORUM//DTD LOC IMM ANS 1.0//EN"
  "http://www.wapforum.org/DTD/immediate-query-answer_1.0.dtd">
%locimmans;

<!ENTITY % locdefans PUBLIC
```

```

"-//WAPFORUM//DTD LOC DEF ANS 1.0//EN"
"http://www.wapforum.org/DTD/deferred-query-answer_1.0.dtd">
%locdefans;

<!ENTITY % locdefrep PUBLIC
"-//WAPFORUM//DTD LOC DEF REP 1.0//EN"
"http://www.wapforum.org/DTD/deferred-query-report_1.0.dtd">
%locdefrep;

<!ENTITY % locdefstopans PUBLIC
"-//WAPFORUM//DTD LOC DEF STOP ANS 1.0//EN"
"http://www.wapforum.org/DTD/deferred-stop-answer_1.0.dtd">
%locdefstopans;

<!ENTITY % locattans PUBLIC
"-//WAPFORUM//DTD LOC ATT ANS 1.0//EN"
"http://www.wapforum.org/DTD/attachment-answer_1.0.dtd">
%locattans;

<!ENTITY % loc PUBLIC
"-//WAPFORUM//DTD LOC LOC 1.0//EN"
"http://www.wapforum.org/DTD/loc_1.0.dtd">
%loc;

<!ENTITY % func PUBLIC
"-//WAPFORUM//DTD LOC FUNC 1.0//EN"
"http://www.wapforum.org/DTD/func_1.0.dtd">
%func;

<!ENTITY % qop PUBLIC
"-//WAPFORUM//DTD LOC QOP 1.0//EN"
"http://www.wapforum.org/DTD/qop_1.0.dtd">
%qop;

<!ENTITY % shape PUBLIC
"-//WAPFORUM//DTD LOC SHAPE 1.0//EN"
"http://www.wapforum.org/DTD/shape_1.0.dtd">
%shape;

<!ENTITY % clientaddress PUBLIC
"-//WAPFORUM//DTD LOC CLIENT ADDRESS 1.0//EN"
"http://www.wapforum.org/DTD/client-address_1.0.dtd">
%clientaddress;

<!ENTITY % trigger PUBLIC
"-//WAPFORUM//DTD LOC TRIGGER 1.0//EN"
"http://www.wapforum.org/DTD/trigger_1.0.dtd">
%trigger;

<!-- -->
<!-- Definitions -->
<!-- -->

<!ELEMENT delivery (immediate-query-answer|
deferred-query-answer|
deferred-query-report|
deferred-stop-answer|

```

attachment-answer)+>

13. Immediate-query-request DTD

13.1. Overview

This DTD specifies the `immediate-query-request` message element, used to convey an immediate query request in an invocation.

Applications must:

1. Specify one or more WAP client addresses (see 22.2.2). If more than one WAP client address is specified in the `immediate-query-request` message, then any requested QoS and location information applies to all those WAP clients.

Applications may:

1. Specify a transaction ID (see 10.3).
2. Provide a short textual description of the application, e.g. "ACME Driving Directions"
3. Specify one or more requested type of location information (see 10.7).
4. Specify requested QoS (see 10.1).
5. Specify a priority level (see 10.8).

13.2. Description of Elements

13.2.1. immediate-query-request

```
<!ELEMENT immediate-query-request (transaction-id?,
    application?,
    msids,
    geo-info?,
    qos?,
    prio?)>
```

The `immediate-query-request` element is the top level element for an immediate-query-request message.

13.3. Document Identifiers

13.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC IMM REQ 1.0//EN"
```

13.4. DTD

```
<!-- -->
<!-- Definitions -->
<!-- -->

<!ELEMENT immediate-query-request (transaction-id?,
    application?,
    msids,
    geo-info?,
```

```
pop?,  
prio?)>
```


14. Immediate-query-answer DTD

14.1. Overview

This DTD specifies the `immediate-query-answer` message element, used to return location information in response to an `immediate-query-request` message.

An `immediate-query-answer` message contains one or more `pos` elements (24.2.1), each containing location information and/or error information for a single WAP client.

WAP location functionalities MUST:

1. Handle transaction ID as specified in 10.3.
2. Create a single `pos` element (see 24.2.1) for each WAP client. The `pos` elements MUST be returned in a single `immediate-query-answer` message.
3. Handle types of location information as specified in 10.7.
4. Handle QoP as specified in 10.1.
5. Handle message priority as specified in 10.8.

14.2. Description of Elements

14.2.1. `immediate-query-answer`

```
<!ELEMENT immediate-query-answer (transaction-id?,
                                   pos+)>
```

The `immediate-query-answer` element is the top level element for an `immediate-query-answer` message.

14.3. Document Identifiers

14.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC IMM ANS 1.0//EN"
```

14.4. DTD

```
<!-- -->
<!-- Definitions -->
<!-- -->

<!ELEMENT immediate-query-answer (transaction-id?,
                                   pos+)>
```

15. Deferred-query-request DTD

15.1. Overview

This DTD specifies the `deferred-query-request` message element, used to convey a deferred request in an invocation.

Applications must:

1. Specify one or more WAP client addresses (see 22.2.2). If more than one WAP client address is specified in the `deferred-query-request` message, then any requested QoP and type of location information applies to all those WAP clients.
2. Specify an address for the recipient of the location information (see 23.2.4).
3. Specify at least one trigger condition (see 27.1).

Applications may:

1. Specify a transaction ID (see 10.3).
2. Provide a short textual description of the application, e.g. "ACME Driving Directions"
3. Specify one or more requested type of location information (see 10.7).
4. Specify requested QoP (see 10.1).
5. Specify a priority level (see 10.8).

15.2. Description of Elements

15.2.1. deferred-query-request

```
<!ELEMENT deferred-query-request (transaction-id?,
    application?,
    msids,
    recipient-addr,
    (periodic-trigger|oneshot-trigger)+,
    geo-info?,
    qop?,
    prio?)>
```

The `deferred-query-request` element is the top level element for the `deferred-query-request` message.

15.3. Document Identifiers

15.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

"-//WAPFORUM//DTD LOC DEF REQ 1.0//EN"

15.4. DTD

```
<! -- -->
```

```
<!-- Definitions -->
<!-- -->

<!ELEMENT deferred-query-request (transaction-id?,
    application?,
    msids,
    recipient-addr,
    (periodic-trigger|oneshot-trigger)+,
    geo-info?,
    qop?,
    prio?)>
```

16. Deferred-query-answer DTD

16.1. Overview

This DTD specifies the `deferred-query-answer` message element, used to return an acknowledgement of a `deferred-query-request` message.

A `deferred-query-answer` message only carries the transaction ID (if specified in the corresponding request), the WAP client address as specified in the request, and a result code.

A WAP location functionality MUST:

1. Handle transaction ID as specified in 10.3 for each `deferred-query-answer` message.
2. Generate a result code for each `deferred-query-answer` message, indicating whether the deferred request was accepted or not.

16.2. Description of Elements

16.2.1. `deferred-query-answer`

```
<!ELEMENT deferred-query-answer (transaction-id?,  
                                (msid,  
                                result)+)>
```

The `deferred-query-answer` element is the top level element for a `deferred-query-answer` message.

16.3. Document Identifiers

16.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC DEF ANS 1.0//EN"
```

16.4. DTD

```
<!--          -->  
<!-- Definitions          -->  
<!--          -->  
  
<!ELEMENT deferred-query-answer (transaction-id?,  
                                (msid,  
                                result)+)>
```

17. Deferred-query-report DTD

17.1. Overview

This DTD specifies the `deferred-query-report` message element, used to return location information in response to a `deferred-query-request` message.

A `deferred-query-report` element contains one or more `pos` elements (24.2.1), each containing location information and/or error information for a single WAP client.

WAP location functionalities MUST:

1. Handle transaction ID as specified in 10.3.
2. Create a single `pos` element (see 24.2.1) for each WAP client. The `pos` elements may be returned either in a single `deferred-query-report` message, or in separate `deferred-query-report` messages.

For example, if periodic location reporting for a large number of WAP clients is requested in a single request message, then getting the location of all the WAP clients can take some time. Rather than waiting for the location of all the WAP clients to become available before returning a report when a trigger occurs, several report messages may be sent, each carrying the location of a subset of the WAP clients.

3. Handle types of location information as specified in 10.7.
4. Handle QoS as specified in 10.1.
5. Handle message priority as specified in 10.8.

17.2. Description of Elements

17.2.1. deferred-query-report

```
<!ELEMENT deferred-query-report (transaction-id?,
                                pos+)>
```

The `deferred-query-report` element is the top level element for a `deferred-query-report` message.

17.3. Document Identifiers

17.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC DEF REP 1.0//EN"
```

17.4. DTD

```
<!--          -->
<!-- Definitions          -->
<!--          -->

<!ELEMENT deferred-query-report (transaction-id?,
                                pos+)>
```

18. Deferred-stop-request DTD

18.1. Overview

This DTD specifies the `deferred-stop-request` message element, used to convey a deferred stop request for a previously submitted invocation.

Applications must:

1. Supply the transaction ID of the `deferred-query-request` message that is to be cancelled (see 10.3).

WAP location functionalities MUST:

1. Cancel all deferred requests associated with the supplied transaction ID.

18.2. Description of Elements

18.2.1. deferred-stop-request

```
<!ELEMENT deferred-stop-request (transaction-id)>
```

The `deferred-stop-request` element is the top level element for `deferred-stop-request` messages.

The transaction ID MUST identify the `deferred-query-request` message that is to be cancelled.

18.3. Document Identifiers

18.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC DEF STOP REQ 1.0//EN"
```

18.4. DTD

```
<!-- -->
<!-- Definitions -->
<!-- -->

<!ELEMENT deferred-stop-request (transaction-id)>
```

19. Deferred-stop-answer DTD

19.1. Overview

This DTD specifies the `deferred-stop-answer` message element, used to acknowledge a `deferred-stop-request` message.

WAP location functionalities MUST:

1. Handle transaction ID as specified in 10.3.
2. Specify a result code.

19.2. Description of Elements

19.2.1. deferred-stop-answer

```
<!ELEMENT deferred-stop-answer (transaction-id,  
                                result)>
```

The `deferred-stop-answer` element is the top level element for a `deferred-stop-answer` message.

19.3. Document Identifiers

19.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC DEF STOP ANS 1.0//EN"
```

19.4. DTD

```
<!-- -->  
<!-- Definitions -->  
<!-- -->  
  
<!ELEMENT deferred-stop-answer (transaction-id,  
                                result)>
```

20. Attachment-request DTD

20.1. Overview

This DTD specifies the `attachment-request` message element, used to convey an attachment request in an invocation.

Applications may:

1. Specify a transaction ID (see 10.3).
2. Provide a short textual description of the application, e.g. "ACME Driving Directions"
3. Specify one or more requested type of location information (see 10.7).
4. Specify requested QoP (see 10.1).
5. Specify a priority level (see 10.8).

20.2. Description of Elements

20.2.1. attachment-request

```
<!ELEMENT attachment-request (transaction-id?,
                               application?,
                               geo-info?,
                               qop?,
                               prio?)>
```

The `attachment-request` element is the top level element for an `attachment-request` message.

20.3. Document Identifiers

20.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC ATT REQ 1.0//EN"
```

20.4. DTD

```
<!-- -->
<!-- Definitions -->
<!-- -->

<!ELEMENT attachment-request (transaction-id?,
                               application?,
                               geo-info?,
                               qop?,
                               prio?)>
```


21. Attachment-answer DTD

21.1. Overview

This DTD specifies the `attachment-answer` message element, used to deliver location information in the attachment service.

An `attachment-answer` message contains a single `pos` element, containing location information and/or error information.

WAP location functionalities MUST:

1. Handle transaction ID as specified in 10.3. If the `attachment-answer` message was not sent in response to an `attachment-request` message (e.g. a WAP client may add a `attachment-answer` message directly to a WAP client request without needing a prior `attachment-request` message), then a transaction ID MUST NOT be present in the `attachment-answer` message.
2. Create a single `pos` element (see 24.2.1).
3. Handle types of location information as specified in 10.7.
4. Handle QoP as specified in 10.1.
5. Handle message priority as specified in 10.8.

WAP location functionalities MUST NOT:

1. Specify any WAP client address within the `pos` element.

This message may be sent as a result of an `attachment-request` message, or directly without a previous request, as defined in [LOCPROT]. If sent directly, the type of location information is implementation specific, and MUST be indicated in the `attachment-answer` message.

21.2. Description of Elements

21.2.1. attachment-answer

```
<!ELEMENT attachment-answer (transaction-id?,
                             pos+)>
```

The `attachment-answer` element is the top level element of an `attachment-answer` message.

21.3. Document Identifiers

21.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC ATT ANS 1.0//EN"
```

21.4. DTD

```
<!--          -->
<!-- Definitions -->
<!--          -->
```

```
<!ELEMENT attachment-answer (transaction-id?,  
                             pos+)>
```

22. Client Address DTD

22.1. Overview

Generic definitions for WAP client address related elements.

22.2. Description of Elements

22.2.1. msids

```
<!ELEMENT msids ((msid|msid-range)+)>
```

The `msids` element encapsulates one or more WAP client addresses. The addresses can be expressed as either one or more specific addresses (using one or more `msid` elements, 22.2.2), or as one or more ranges of addresses (using one or more `msid-range` elements, 22.2.3).

22.2.2. msid

```
<!ELEMENT msid (#PCDATA)>
<!ATTLIST msid msid-type CDATA #REQUIRED>
```

A single WAP client is identified using the `msid` element, which takes a string value. It has a required attribute `msid-type` that determines the format of the address value. The following address formats are specified by the WAP location specification:

msid-type	Address format
PLMN	A phone number, e.g. +4479680254567, format as specified below (<code>global-phone-number</code>).
IPv4	An IP version 4 address [RFC791], format see below (<code>ipv4</code>). E.g. 123.456.789.123.
IPv6	An IP version 6 address [RFC2373], format see below (<code>ipv6</code>). E.g. ABCD:6785:F65D:56F4:D687:F7DC:372F:F4D5
PAP-USER	A PAP user type, format see below (<code>user-type</code>). Examples: <pre>john.doe@wapforum.org/TYPE=USER@ppg.carrier.com ; user-defined identifier for ; john.doe@wapforum.org 47397547589/TYPE=USER@carrier.com ; user-defined identifier for 47397547589 +155519990730/TYPE=USER@locserv.carrier.com ; user-defined identifier that looks like a ; phone number</pre>

The formats of the addresses are specified by the following syntax (reused from [PUSH_PPG]):

```
global-phone-number = "+" 1*( DIGIT / written-sep )
written-sep = ( "-" / "." )

ipv4 = 1*3DIGIT 3( "." 1*3DIGIT ) ; IPv4 address value [RFC791]

ipv6 = 4HEXDIG 7( ":" 4HEXDIG ) ; IPv6 address per [RFC 2373]
```

```

user-type = (escaped-value "/"TYPE=USER@" domain-specifier)
domain-specifier = dom-fragment *( "." dom-fragment )
dom-fragment = ( ALPHA / DIGIT ) *( ALPHA / DIGIT / "-" )
escaped-value = 1*( safe-char )
; the actual value escaped to use only safe characters by replacing
; any unsafe-octet with its hex-escape
safe-char = ALPHA / DIGIT / "+" / "-" / "." / "%" / "_"
unsafe-octet = %x00-2A / %x2C / %x2F / %x3A-40 / %x5B-60 / %x7B-FF
hex-escape = "%" 2HEXDIG ; value of octet as hexadecimal value

```

22.2.3. msid-range

```

<!ELEMENT msid-range (start-msid, stop-msid)>
<!ATTLIST msid-range msid-type CDATA #REQUIRED>

```

Support for msid-ranges in WAP location functionalities is optional.

A range of WAP client addresses may be specified by using the msid-range element. It contains two other elements: start-msid and stop-msid. These two elements specify the start and stop address respectively of the range. The range runs from start to stop including both the start address and the stop address.

The attributes are the same as for the msid element (see 22.2.2), and apply to the start and stop addresses.

22.2.4. start-msid

```

<!ELEMENT start-msid (#PCDATA)>

```

Contains the value of the start (first) address of an address range.

It is used inside an msid-range element, which specifies the type and format of the address.

22.2.5. stop-msid

```

<!ELEMENT stop-msid (#PCDATA)>

```

Contains the value of the stop (last) address of an address range.

It is used inside an msid-range element, which specifies the type and format of the address.

22.3. Document Identifiers

22.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC CLIENT ADDRESS 1.0//EN"
```

22.4. DTD

```

<!-- -->
<!-- Definitions -->
<!-- -->

<!ELEMENT msids ((msid|msid-range)+)>

<!ELEMENT msid (#PCDATA)>
<!ATTLIST msid msid-type CDATA #REQUIRED>

<!ELEMENT msid-range (start-msid, stop-msid)>
<!ATTLIST msid-range msid-type CDATA #REQUIRED>

```

```
<!ELEMENT start-msid (#PCDATA)>  
<!ELEMENT stop-msid (#PCDATA)>
```

23. Func DTD

23.1. Overview

Generic definitions for functional elements.

23.2. Description of Elements

23.2.1. application

```
<!ELEMENT application (#PCDATA)>
<!ATTLIST application id CDATA #IMPLIED>
<!ATTLIST application encoding CDATA #IMPLIED>
```

Used in invocations to provide a short human readable textual description about the requesting application. Internationalisation of the value is supported through the `encoding` element as specified in 10.3.

The `id` attribute may be used to provide a machine readable identifier for the application. Note that such an identifier is unsecure (see also [LOCFRAME]).

Example:

```
<application>ACME Driving Directions</application>
```

23.2.2. poserr

```
<!ELEMENT poserr (result, time?)>
```

Used in answer and report messages to indicate that location information could not be delivered due to some error. The `result` element contains the error information, the `time` element a time stamp for when the error response was generated.

23.2.3. prio

```
<!ELEMENT prio EMPTY>
<!ATTLIST prio prio-type (normal|high) #REQUIRED>
```

Applications may use the `prio` element in invocations to indicate a requested priority of a message. Two levels are specified by the WAP location specification: “normal” and “high”.

23.2.4. recipient-addr

```
<!ELEMENT recipient-addr (#PCDATA)>
```

Used in invocations (deferred queries) to specify an address that location information should be posted to. The address **MUST** be a URI [RFC2396].

Example:

```
<recipient-addr>
  http://www.wapforum.org/app/cgi-bin/loc.cgi
</recipient-addr>
```

23.2.5. result

```
<!ELEMENT result (#PCDATA)>
<!ATTLIST result resid CDATA #REQUIRED>
<!ATTLIST result slogan CDATA #IMPLIED>
<!ATTLIST result encoding CDATA #IMPLIED>
```

Used in responses to indicate the result of a particular request message. The `result` element contains a mandatory `resid` attribute defining a result code, followed by an optional `slogan` attribute (a short textual description of the error).

WAP location functionalities MAY provide additional information in the form of human readable information added in the body of the result element. Any such information is implementation specific and meant for error logging or similar, not for machine processing. Internationalisation of the value is supported through the `encoding` element as specified in 10.3.

Example:

```
<result resid="302" slogan="FORMAT NOT SUPPORTED">
  Geo-code "street-address" not supported.
</result>
```

Values for the `resid` and `slogan` attributes are specified in the table of error codes below.

Unused error codes are reserved for future use, except values above 1000, which may be used for vendor specific error codes.

resid	Slogan	Description
0	OK	No error occurred while processing the request. In the deferred query case, this error code can only occur in the <code>deferred-query-answer</code> and the <code>deferred-stop-answer</code> messages. In the case of transport mappings not supporting these messages (e.g. Push, see [LOCPROT]) this error code cannot be returned.
1	SYSTEM FAILURE	The request can not be handled because of a general problem in the location server or the underlying network
3	UNAUTHORIZED APPLICATION	The application is not authorised to obtain the location of the WAP client.
4	UNKNOWN SUBSCRIBER	Unknown subscriber. The subscriber is unknown, i.e. no such subscription exists.
5	ABSENT SUBSCRIBER	The WAP client is currently not reachable.
6	POSITION METHOD FAILURE	The WAP location functionality failed to obtain the position of the WAP client.
7	CONGESTION IN LOCATION FUNCTIONALITY	The request cannot be handled due to congestion in the WAP location functionality.
8	CONGESTION IN MOBILE NETWORK	The request can not be handled due to congestion in the mobile network
9	INSUFFICIENT RESOURCES	The WAP location functionality was unable to complete a request due to insufficient resources, e.g. lack of memory, the invocation document was too complex, it contained too many request messages, etc.

resid	Slogan	Description
10	SYNTAX ERROR	The position request has a syntax error, e.g. malformed or non-validated XML syntax, invalid values in some elements or attributes, invalid format of values of attributes and elements, missing required elements, etc. In the deferred query case, this error code can only occur in the <code>deferred-query-answer</code> and the <code>deferred-stop-answer</code> messages. In the case of transport mappings not supporting these messages (e.g. Push, see [LOCPROT]) this error code cannot be returned.
11	PROTOCOL ELEMENT NOT SUPPORTED	An optional protocol element specified in the position request is not supported by this implementation, e.g. <code>msid-range</code> .
12	SERVICE NOT SUPPORTED	A requested service, e.g. deferred queries or a periodic trigger, is not supported in the WAP location functionality.
13	TYPE OF LOCATION INFORMATION NOT SUPPORTED	A requested type of location information is not supported, e.g. speed, altitude etc.
14	TYPE OF LOCATION INFORMATION NOT CURRENTLY SUPPORTED	A requested type of location information is temporarily unavailable, e.g. due to some temporary internal problem.
15	QOP NOT ATTAINABLE	The requested quality of position (10.6) cannot be provided.
16	QOP NOT CURRENTLY ATTAINABLE	The WAP location functionality is temporarily unable to provide the requested quality of position (10.6), e.g. due to a WAP client being out of coverage.
17	REPORTING WILL STOP	A deferred query request has been cancelled, and further reports will not be produced. This error code can only occur in a <code>deferred-query-report</code> message.
18	TIME EXPIRED	The start time or stop time of a deferred query has expired.
19	UNSUPPORTED VERSION	The version number of the received Invocation document is not supported by the WAP Location Functionality (10.2).
1000-		Vendor specific error codes.

23.2.6. time

```
<!ELEMENT time (#PCDATA)>
<!ATTLIST time utc-off CDATA "+0000">
```

Used to specify a time stamp, if known, in responses, relative to UTC. If the time is not known, the element is not used.

This element should be interpreted as follows:

- For location deliveries (when actual location information is delivered), the time stamp is the time, if known, when the original position data was actually collected.
- In all other cases (error responses, acknowledgement messages, etc.), the time stamp is the time, if known, when the response message was generated.

The value of the `time` element MUST be expressed in a date/time representation based on [ISO8601]. However, the use of time zones is not allowed; the value of the `time` element MUST always be expressed in Co-ordinated Universal Time (UTC), a 24-hour timekeeping system (indicated by the "Z"). The format is:

```
YYYY-MM-DDThh:mm:ssZ
```

Where:

- YYYY = 4 digit year ("0000" ... "9999")
- MM = 2 digit month ("01"=January, "02"=February ... "12"=December)
- DD = 2 digit day ("01", "02" ... "31")
- hh = 2 digit hour, 24-hour timekeeping system ("00" ... "23")
- mm = 2 digit minute ("00" ... "59")
- ss = 2 digit second ("00" ... "59")

Note: "T" and "Z" appear literally in the string.

Example: 6.40 in the morning UTC on 30 April 1999.

```
1999-04-30T06:40:00Z
```

The `time` element contains an optional attribute specifying the offset (hours and minutes) of the time in relation to UTC (default 0). The offset follows the following syntax:

```
[+|-]hhmm
```

A positive offset value indicates a time zone east of Greenwich.

Example: The following times are equivalent.

```
<time utc-off="+0200">2001-06-30T18:28:10Z</time>
<time>2001-06-30T16:28:10Z</time>
```

23.2.7. transaction-id

```
<!ELEMENT transaction-id (#PCDATA)>
```

May be used in messages as defined in 10.5.

23.3. Document Identifiers

23.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC FUNC 1.0//EN"
```

23.4. DTD

```
<!-- Definitions -->
```

```
<!ELEMENT application (#PCDATA)>
<!ATTLIST application id CDATA #IMPLIED>
<!ATTLIST application encoding CDATA #IMPLIED>

<!ELEMENT poserr (result, time?)>

<!ELEMENT prio EMPTY>
<!ATTLIST prio prio-type (normal|high) #REQUIRED>

<!ELEMENT recipient-addr (#PCDATA)>

<!ELEMENT result (#PCDATA)>
<!ATTLIST result resid CDATA #REQUIRED>
<!ATTLIST result slogan CDATA #IMPLIED>
<!ATTLIST result encoding CDATA #IMPLIED>

<!ELEMENT time (#PCDATA)>
<!ATTLIST time utc-off CDATA "+0000">

<!ELEMENT transaction-id (#PCDATA)>
```

24. Loc DTD

24.1. Overview

Generic definitions for location related elements.

24.2. Description of Elements

24.2.1. pos

```
<!ELEMENT pos (msid?, (pd|poserr)+)>
```

Used in answer and report messages to convey location information (the `pd` element, see 24.2.2) and/or error information (the `poserr` element, see 23.2.2). The `msid` element (22.2.2) MUST be used to indicate the WAP client address, except in `attachment-answer` messages. The `pos` element MUST contain at least one `pd` or `poserr` element.

24.2.2. pd

```
<!ELEMENT pd (time?, ((coord-datum|ref-sys),shape)*,
                (altitude, alt-acc?)?,
                (speed, speed-acc?)?,
                (direction, dir-acc?)?,
                (heading, heading-acc?)?,
                geo-code*,
                lev-conf?)>
```

Used within a `pos` element to convey location information. A `pd` element MUST only contain information regarding a single WAP client, but MAY contain multiple types of location information for the same WAP client and related to the same timestamp.

A time stamp MUST be present for all location information, unless unknown. See 23.2.6. The same time stamp applies to all location information provided within a single `pd` element.

A `lev-conf` element MAY be used to indicate the level of confidence in the delivered accuracy, e.g. “with 65% probability”. See 10.6.2. The level of confidence applies to all accuracy elements within the `pd` element.

Example:

```
<pd>
  <time>2001-06-30T16:28:10Z</time>
  <coord-datum coord-sys="LL" datum="WGS-84"/>
  <shape>
    ...
  </shape>
  <speed>30</speed>
</pd>
```

Multiple types of location information MAY be provided within the same `pd` element, including position information in different coordinate systems and datum - i.e. a single `pd` element may contain multiple `shape` elements, carrying position information in different coordinate systems and datum. Each `shape` element is always preceded by either a `coord-datum` element or a `ref-sys` element, identifying the coordinate system and datum used within each `shape` element.

Example:

```
<pd>
  <coord-datum coord-sys="LL" datum="WGS-84" />
  <shape>
    ...
  </shape>
  <ref-sys name="EPSG:4326" />
  <shape>
    ...
  </shape>
</pd>
```

24.2.3. altitude

```
<!ELEMENT altitude (#PCDATA)>
```

Used in answer and report messages to convey altitude information. The altitude is specified as metres above mean sea level, using a '.' as a decimal point, and based on WGS-84 [WGS84]. Altitude is not specified by this specification for any other datum.

Used empty in request messages to request altitude information.

Example:

```
<altitude>135.2</altitude>
```

24.2.4. direction

```
<!ELEMENT direction (#PCDATA)>
```

Used in answer and report messages to convey direction of the movement of the WAP Client (true course over ground). If the WAP client is stationary, then direction is unspecified. Direction MUST be given in degrees clockwise relative to true north, using a '.' as a decimal point, and based on WGS-84 [WGS84]. Values MUST be greater than or equal to zero, and less than 360. Direction is not specified by this specification for any other datum.

Used empty in request messages to request direction information.

Example:

```
<direction>345.8</direction>
```

24.2.5. heading

```
<!ELEMENT heading (#PCDATA)>
```

Used in answer and report messages to convey heading of the WAP Client (angle of view or orientation). Heading is thus independent of direction and can be specified also when the WAP client is stationary. Heading MUST be given in degrees clockwise relative to true north, using a '.' as a decimal point, and based on WGS-84 [WGS84]. Values MUST be greater than or equal to zero, and less than 360. It is not specified by this specification for any other datum.

Used empty in request messages to request heading information.

```
<heading>43.9</heading>
```

24.2.6. geo-code

```
<!ELEMENT geo-code (#PCDATA)>
<!ATTLIST geo-code type CDATA #REQUIRED>
```

```
<!ATTLIST geo-code encoding CDATA #IMPLIED>
```

Used empty in request messages to request specific geo-codes (e.g. postal code).

Used in answer and report messages to deliver a geo-code value. Internationalisation of the value is supported through the encoding element as specified in 10.3.

A geo-code can be viewed as a combination of a type, e.g. “postal-code”, and a value, e.g. “BT1 2FJ”. The WAP location specification only specifies a small basic interoperable set of geo-code types (picked from the ITU-T X.520 specification, [X.520]). This version of the WAP location specification does not specify any syntax for the geo-code values - these are treated as string values.

The `type` attribute **MUST** be used in both invocations and responses to indicate the geo-code type. The following values are specified by the WAP location specification:

Type value	Explanation
country	Country name, e.g. “United Kingdom”
locality	A named location, e.g. “Edinburgh”
state-or-province	Name of state or province, e.g. “Kent” or “Ohio”
street-address	Specifies a site for the local distribution and physical delivery in a postal address, i.e. the street name, place, avenue, and the house number. For example “101-111 Donegal Street” or “Siechenmarschstrasse 11A”
postal-code	Postal code or zip code, e.g. “BT1 2FJ” or “CA 94063”

In a response, the actual value **MUST** be included as a string value.

Example: Request for postal code in an invocation.

```
<geo-code type="postal-code" />
```

Example: Delivery of postal code in a response.

```
<geo-code type="postal-code">"BT1 2FJ"</geo-code>
```

24.2.7. speed

```
<!ELEMENT speed (#PCDATA)>
```

Used in answer and report messages to convey speed over ground information. Speed **MUST** be given as a non-negative decimal number, using a ‘.’ as a decimal point, in metres per second.

Used empty in request messages to request speed information.

Example:

```
<speed>25.6</speed>
```

24.2.8. geo-info

```
<!ELEMENT geo-info (coord-datum |
                    ref-sys |
                    geo-code |
                    speed |
                    altitude |
                    direction |
                    heading)+>
```

Used in request messages to specify a requested type of location information. Note that the only type of information that is required for WAP location functionalities is latitude/longitude coordinates in the WGS-84 datum [WGS84] - all other types of information specified here are optional (see 10.7).

More than one type of location information MAY be requested at the same time in a single `geo-info` element. Depending on what information is requested, the following elements MAY be used:

Requested information	Elements to use	Example
Specific coordinate system and datum.	A <code>coord-datum</code> element MUST be used to request a specific coordinate system and datum (e.g. latitude/longitude coordinate system, and WGS-84 datum). More than one <code>coord-datum</code> element MAY be used.	<pre><geo-info> <coord-datum coord-sys="UTM" datum="WGS-84" /> </geo-info></pre>
Reference system.	A <code>ref-sys</code> element MUST be used to request location information in a particular named spatial reference system. More than one <code>ref-sys</code> element MAY be used.	<pre><geo-info> <ref-sys name="EPSG:4326" /> </geo-info></pre>
Geo code.	A <code>geo-code</code> element MUST be used to request a certain geo-code type, e.g. a postal code. More than one <code>geo-code</code> element MAY be used.	<pre><geo-info> <geo-code type="street-address" /> <geo-code type="locality" /> </geo-info></pre>
Speed.	A single <code>speed</code> element MUST be used to request speed information.	<pre><geo-info> <speed/> </geo-info></pre>
Altitude.	A single <code>altitude</code> element MUST be used to request altitude information.	<pre><geo-info> <altitude/> </geo-info></pre>
Direction	A single <code>direction</code> element MUST be used to request direction information.	<pre><geo-info> <direction/> </geo-info></pre>
Heading	A single <code>heading</code> element MUST be used to request heading information	<pre><geo-info> <heading/> </geo-info></pre>

24.2.9. coord-datum

```
<!ELEMENT coord-datum EMPTY>
<!ATTLIST coord-datum coord-sys CDATA #REQUIRED>
<!ATTLIST coord-datum datum CDATA #REQUIRED>
```

Used in request messages to specify a specific coordinate system and datum. Used in answer and report messages to indicate the coordinate system and datum of the delivered location information.

The `coord-sys` attribute MUST be used to specify the coordinate system. The following values are specified:

coord-sys value	Explanation
LL	Latitude/longitude coordinates (default).
UTM	UTM coordinates.

The `datum` attribute MUST be used to specify the datum. The following values are specified:

datum value	Explanation
WGS-84	WGS-84 datum (default).

Example:

```
<coord-datum coord-sys="UTM" datum="WGS-84" />
```

24.2.10. ref-sys

```
<!ELEMENT ref-sys EMPTY>
<!ATTLIST ref-sys name CDATA #REQUIRED>
```

Used in request messages to specify a required spatial reference system. Used in answer and report messages to indicate the reference system of the delivered geographical information (when applicable).

The name attribute **MUST** be used to specify the reference system. Names of spatial references and their definitions are specified by [OGIS] and [EPSG], and are not defined in this specification.

Example:

```
<ref-sys name="EPSG:4326" />
```

24.2.11. ll-point

```
<!ELEMENT ll-point (lat, long)>
```

Used to express a point in latitude and longitude coordinates.

Example:

```
<ll-point>
  <lat>45.438765</lat>
  <long>16.537628</long>
</ll-point>
```

24.2.12. lat

```
<!ELEMENT lat (#PCDATA)>
```

Specifies the geodetic latitude of a point as the angle from the equatorial plane to the vertical direction of a line normal to the reference ellipsoid.

The format **MUST** be [+/- decimal degrees], positive N, using a '.' as a decimal point.

Example:

```
<lat>45.438765</lat>
```

24.2.13. long

```
<!ELEMENT long (#PCDATA)>
```

Specifies the longitude of a point as the angle between a reference plane and a plane passing through the point, both planes being perpendicular to the equatorial plane.

The format **MUST** be [+/- decimal degrees], positive E, using a '.' as a decimal point.

Example:

```
<long>16.537628</long>
```

24.2.14. utm-point

```
<!ELEMENT utm-point (easting, northing, zone, zone-des)>
```

Used to express a point in UTM coordinates.

24.2.15. easting

```
<!ELEMENT easting (#PCDATA)>
```

Used in the UTM coordinate system. Eastings are measured in metres from the central meridian, using a '.' as a decimal point.

Example:

```
<eastings>621160.98</eastings>
```

24.2.16. northing

```
<!ELEMENT northing (#PCDATA)>
```

Used in the UTM coordinate system. Northings are measured in meters from the equator, using a '.' as a decimal point.

Example:

```
<northing>3349893.53</northing>
```

24.2.17. zone

```
<!ELEMENT zone (#PCDATA)>
```

Identifies the zone (a positive integer number) when the UTM coordinate system is used.

Example:

```
<zone>14</zone>
```

24.2.18. zone-des

```
<!ELEMENT zone-des (#PCDATA)>
```

Identifies the zone designator (character string) when the UTM coordinate system is used.

Example:

```
<zone-des>R</zone-des>
```

24.3. Document Identifiers

24.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC LOC 1.0//EN"
```

24.4. DTD

```
<!-- -->
<!-- Definitions -->
<!-- -->

<!ELEMENT pos (msid?, (pd|poserr)+)>

<!ELEMENT pd (time?, ((coord-datum|ref-sys),shape)*,
  (altitude, alt-acc)?,
  (speed, speed-acc)?,
  (direction, dir-acc)?,
  (heading, heading-acc)?,
  geo-code*,
  lev-conf?)>
```



```
<!ELEMENT altitude (#PCDATA)>
<!ELEMENT direction (#PCDATA)>
<!ELEMENT heading (#PCDATA)>
<!ELEMENT speed (#PCDATA)>
<!ELEMENT geo-info (coord-datum|
                    ref-sys|
                    geo-code|
                    speed|
                    altitude|
                    direction|
                    heading)+>
<!ELEMENT coord-datum EMPTY>
<!ATTLIST coord-datum coord-sys CDATA #REQUIRED>
<!ATTLIST coord-datum datum CDATA #REQUIRED>
<!ELEMENT geo-code (#PCDATA)>
<!ATTLIST geo-code type CDATA #REQUIRED>
<!ATTLIST geo-code encoding CDATA #IMPLIED>
<!ELEMENT ref-sys EMPTY>
<!ATTLIST ref-sys name CDATA #REQUIRED>
<!ELEMENT ll-point (lat, long)>
<!ELEMENT lat (#PCDATA)>
<!ELEMENT long (#PCDATA)>
<!ELEMENT utm-point (easting, northing, zone, zone-des)>
<!ELEMENT easting (#PCDATA)>
<!ELEMENT northing (#PCDATA)>
<!ELEMENT zone (#PCDATA)>
<!ELEMENT zone-des (#PCDATA)>
```

25. Shape DTD

25.1. Overview

Generic definitions for elements related to geometric shapes.

Geometric shapes are described using the `shape` element, which may contain one of the following elements:

- `point` (a single point).
Used, for example, to return a position without accuracy information.
- `circle`
Used, for example, to return a position with accuracy in the form of a radius - “within 50 metres”.
- `circ-arc` (a circular arch segment with an inner and an outer radius)
- `ellipse`.
Used, for example, to return a position with accuracy in the form of an error ellipse.
- `polygon` (a closed polygon defined by a list of points)
Used, for example, to return more complex error shapes.

Example:

```
<shape>
  <circle>
    <point>
      <ll-point>
        <lat>30.347692</lat>
        <long>45.437628</long>
      </ll-point>
    </point>
    <rad>240</rad>
  </circle>
</shape>
```

25.2. Description of Elements

25.2.1. shape

```
<!ELEMENT shape (point|circle|circ-arc|ellipse|polygon)>
```

Top level element for describing shapes.

25.2.2. point

```
<!ELEMENT point (ll-point|utm-point)>
```

Specifies a single point, either using latitude and longitude coordinates (the `ll-point` element, see 24.2.11), or using UTM coordinates (the `utm-point` element, see 24.2.14).

25.2.3. angle

```
<!ELEMENT angle (#PCDATA)>
```

Specifies the angle of rotation of an ellipse measured clockwise from north. See 25.2.6.

25.2.4. circ-arc

```
<!ELEMENT circ-arc (point, in-rad, out-rad, start-angle, stop-angle)>
```

Specifies a circular arc.

An arc is specified by a point of origin, one start and one stop angle, plus one inner radius and one outer radius. The start and stop angles are measured in degrees from north, and the radii are measured in metres.

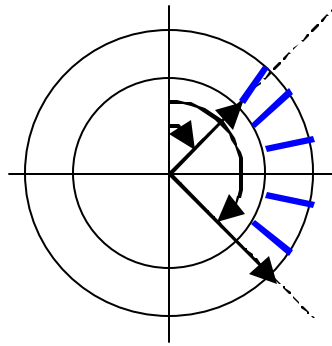


Figure 2. Circular arc.

25.2.5. circle

```
<!ELEMENT circle (point, rad)>
```

Specifies a circle.

A circle is specified as a centre point and a radius (metres).

25.2.6. ellipse

```
<!ELEMENT ellipse (point, angle, semi-major, semi-minor)>
```

Specifies an ellipse.

An ellipse is specified by:

- A centre point
- An angle of rotation (degrees relative to north, positive values indicating clockwise)
- Major axis radius (metres)
- Minor axis radius (metres)

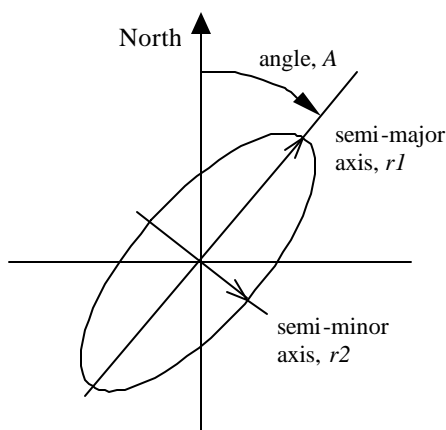


Figure 3. Ellipse.

25.2.7. in-rad

```
<!ELEMENT in-rad (#PCDATA)>
```

Specifies the inner radius of an arc in meters. See 25.2.4.

25.2.8. out-rad

```
<!ELEMENT out-rad (#PCDATA)>
```

Specifies the outer radius of an arc in meters. See 25.2.4.

25.2.9. polygon

```
<!ELEMENT polygon (point+)>
```

Specifies a polygon.

A polygon is specified as an ordered series of points interconnected by straight lines. The last point is connected to the first. A polygon **MUST** satisfy the following constraints:

- The minimum number of points is 3.
- A connecting line must not cross another connecting line.
- The described area is situated to the right of the lines with the downward direction being toward the Earth's center and the forward direction being from a point to the next.

25.2.10. rad

```
<!ELEMENT rad (#PCDATA)>
```

Specifies the radius of a circle in meters. See 25.2.5.

25.2.11. semi-major

```
<!ELEMENT semi-major (#PCDATA)>
```

Specifies the length of the semi-major axis of an ellipse in meters. See 25.2.6.

25.2.12. semi-minor

```
<!ELEMENT semi-minor (#PCDATA)>
```

Specifies the length of the semi-minor axis of an ellipse in meters. See 25.2.6.

25.2.13. start-angle

```
<!ELEMENT start-angle (#PCDATA)>
```

Specifies a start angle in degrees of a circular arc. See 25.2.4.

25.2.14. stop-angle

```
<!ELEMENT stop-angle (#PCDATA)>
```

Specifies a stop angle in degrees of a circular arc. See 25.2.4.

25.3. Document Identifiers

25.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC SHAPE 1.0//EN"
```

25.4. DTD

```
<!-- -->
<!-- Definitions -->
<!-- -->

<!ELEMENT shape (point|circle|circ-arc|ellipse|polygon)>
<!ELEMENT point (ll-point|utm-point)>
<!ELEMENT angle (#PCDATA)>
<!ELEMENT circ-arc (point, in-rad, out-rad, start-angle, stop-angle)>
<!ELEMENT circle (point, rad)>
<!ELEMENT ellipse (point, angle, semi-major, semi-minor)>
<!ELEMENT in-rad (#PCDATA)>
<!ELEMENT out-rad (#PCDATA)>
<!ELEMENT polygon (point+)>
<!ELEMENT rad (#PCDATA)>
<!ELEMENT semi-major (#PCDATA)>
<!ELEMENT semi-minor (#PCDATA)>
<!ELEMENT start-angle (#PCDATA)>
<!ELEMENT stop-angle (#PCDATA)>
```

26. QoP DTD

26.1. Overview

Generic definitions for elements related to quality of position (age, accuracy and confidence level).

26.2. Description of Elements

26.2.1. qop

```
<!ELEMENT qop ( maxage?,
                hor-acc?,
                alt-acc?,
                speed-acc?,
                dir-acc?,
                heading-acc? )>
<!ATTLIST qop must-be-satisfied (yes|no) "no">
```

Used in invocations to indicate a requested quality of position (see 10.1).

A maximum age can be requested using the `maxage` element (26.2.7).

A horizontal accuracy can be requested using the `hor-acc` element (26.2.4).

An altitude accuracy can be requested using the `alt-acc` element (26.2.2).

A speed accuracy can be requested using the `speed-acc` element (26.2.6).

A direction accuracy can be requested using the `dir-acc` element (26.2.3).

A direction accuracy can be requested using the `heading-acc` element (26.2.3).

The `must-be-satisfied` attribute MAY be used to indicate that the requested `qop` is required (see 10.6).

26.2.2. alt-acc

```
<!ELEMENT alt-acc (#PCDATA)>
```

Used in request messages to specify the requested altitude accuracy. Used in answer and report messages to indicate the delivered altitude accuracy. In both cases, the accuracy MUST be given in metres, as a non-negative decimal number using a '.' as a decimal point.

Example: Altitude information is within 50 metres.

```
<alt-acc>50</alt-acc>
```

26.2.3. dir-acc

```
<!ELEMENT dir-acc (#PCDATA)>
```

Used in request messages to specify the requested direction accuracy. Used in answer and report messages to indicate the delivered direction accuracy. In both cases, the accuracy MUST be given in degrees, as a non-negative decimal number using a '.' as a decimal point.

Example: Direction information is within 5 degrees.

```
<dir-acc>5</dir-acc>
```

26.2.4. heading-acc

```
<!ELEMENT heading-acc (#PCDATA)>
```

Used in request messages to specify the requested heading accuracy. Used in answer and report messages to indicate the delivered heading accuracy. In both cases, the accuracy MUST be given in degrees, as a non-negative decimal number using a '.' as a decimal point.

Example: Heading information is within 5 degrees.

```
<heading-acc>5</heading-acc>
```

26.2.5. hor-acc

```
<!ELEMENT hor-acc (#PCDATA)>
```

Used in request messages to specify the requested horizontal accuracy. The accuracy MUST be given in metres, as a non-negative decimal number using a '.' as a decimal point.

Example: Horizontal accuracy is within 50 metres.

```
<hor-acc>50</hor-acc>
```

26.2.6. speed-acc

```
<!ELEMENT speed-acc (#PCDATA)>
```

Used in request messages to specify the requested speed accuracy. Used in answer and report messages to indicate the delivered speed accuracy. In both cases, the accuracy MUST be given in metres per second, as a non-negative decimal number using a '.' as a decimal point.

Example: Speed information is within 2.5 metres per second.

```
<speed-acc>2.5</speed-acc>
```

26.2.7. maxage

```
<!ELEMENT maxage (#PCDATA)>
```

Used in invocations to indicate a requested maximum age of location information, in seconds, as a non-negative decimal number using a '.' as a decimal point.

Example:

```
<maxage>25</maxage>
```

26.2.8. lev-conf

```
<!ELEMENT lev-conf (#PCDATA)>
```

Used in responses to indicate the level of confidence (percent) of the provided accuracy information, if known, as a non-negative decimal number using a '.' as a decimal point. See 10.6.2. The level of confidence applies to all accuracy elements within a pd element (see 24.2.2).

Example: "with 65% probability"

```
<lev-conf>65</levconf>
```

26.3. Document Identifiers

26.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC QOP 1.0//EN"
```


26.4. DTD

```
<!-- -->
<!-- Definitions -->
<!-- -->

<!ELEMENT qop ( maxage?,
                hor-acc?,
                alt-acc?,
                speed-acc?,
                dir-acc?,
                heading-acc?)>
<!ATTLIST qop must-be-satisfied (yes|no) "no">

<!ELEMENT alt-acc (#PCDATA)>
<!ELEMENT dir-acc (#PCDATA)>
<!ELEMENT heading-acc (#PCDATA)>
<!ELEMENT hor-acc (#PCDATA)>
<!ELEMENT speed-acc (#PCDATA)>
<!ELEMENT maxage (#PCDATA)>
<!ELEMENT lev-conf (#PCDATA)>
```

27. Trigger DTD

27.1. Overview

Generic definitions for trigger conditions. The trigger DTD is used to specify trigger conditions in deferred queries.

27.2. Description of Elements

27.2.1. periodic-trigger

```
<!ELEMENT periodic-trigger (interval, start-time?, stop-time?)>
```

Specifies a periodic trigger. An interval **MUST** be specified, and a start time and/or a stop time **MAY** be specified. No specified start time means deliveries will start as soon as possible. No specified stop time means deliveries will continue until explicitly stopped, either by the application (through sending a `deferred-stop-request` message), or by the WAP location functionality through returning a “reporting will stop” error code (see 23.2.5).

The stop time **MUST** be greater than the start time, and the start time **MUST** be greater than the current time. If they are not, the error “TIME EXPIRED” **MUST** be returned.

A WAP client **MAY** not support the start-time or stop-time elements. If any unsupported element is specified in a request, the “PROTOCOL ELEMENT NOT SUPPORTED” error code **MUST** be returned.

27.2.2. oneshot-trigger

```
<!ELEMENT oneshot-trigger (start-time?)>
```

Specifies a one-shot trigger. A start time **MAY** be specified. No specified start time means the delivery will take place as soon as possible.

The start time **MUST** be greater than the current time. If it is not, the error “TIME EXPIRED” **MUST** be returned.

A WAP client **MAY** not support the start-time element. If any unsupported element is specified in a request, the “PROTOCOL ELEMENT NOT SUPPORTED” error code **MUST** be returned.

27.2.3. interval

```
<!ELEMENT interval (#PCDATA)>
```

Specifies an interval in seconds for periodic triggers, as a non-negative decimal number using a ‘.’ as a decimal point.

Example:

```
<interval>3600</interval>
```

27.2.4. start-time

```
<!ELEMENT start-time (#PCDATA)>
<!ATTLIST start-time utc-off CDATA "+0000">
```

Specifies a start time for a trigger. Same format as the `time` element, see 23.2.6.

Example:

```
<start-time>20010630162810</start-time>
```

27.2.5. stop-time

```
<!ELEMENT stop-time (#PCDATA)>
<!ATTLIST stop-time utc-off CDATA "+0000">
```

Specifies a stop time for a trigger. Same format as the time element, see 23.2.6.

Example:

```
<stop-time utc-off="+0200">2001-06-30T14:28:10Z</stop-time>
```

27.3. Document Identifiers

27.3.1. SGML Public Identifier

Editor's note: This identifier has not yet been registered with the IANA or ISO 9070 registrar

```
"-//WAPFORUM//DTD LOC TRIGGER 1.0//EN"
```

27.4. DTD

```
<!-- -->
<!-- Definitions -->
<!-- -->

<!ELEMENT periodic-trigger (interval, start-time?, stop-time?)>

<!ELEMENT oneshot-trigger (start-time?)>

<!ELEMENT interval (#PCDATA)>

<!ELEMENT start-time (#PCDATA)>
<!ATTLIST start-time utc-off CDATA "+0000">

<!ELEMENT stop-time (#PCDATA)>
<!ATTLIST stop-time utc-off CDATA "+0000">
```

28. A Compact Binary Representation of Location XML Documents

The WAP location invocation and delivery XML documents MAY be encoded using a compact binary representation. This content format is based upon the WAP Binary XML Content Format [WBXML].

28.1. Extension Tokens

28.1.1. Tag Tokens

This specification defines a set of single-byte tokens corresponding to the tags defined in the different DTDs. These tokens are defined within code pages zero and one, and both the invocation and delivery documents share the same tokenisation table.

28.1.2. Attribute Tokens

This specification defines a set of single-byte tokens corresponding to the attribute names and values defined in the different DTDs. All of these tokens are defined within code page zero, and all DTDs share the same token space.

28.2. Encoding Semantics

28.2.1. Document Validation

XML document validation (see [XML]) SHOULD occur during the process of tokenising a location invocation or delivery document and, if done, it MUST be based on the DOCTYPE declared in the document. When validating the source text, the tokenisation process MUST accept any DOCTYPE or public identifier, if the document is identified as a WAP location media type (see [LOCPROT]).

The tokenisation process MUST check that the source document is XML well-formed, and it SHOULD notify the originator of the request (in the case of pull) or the push initiator (in the case of push) of any well-formedness or validity errors detected in the source document.

28.3. Numeric Constants

28.3.1. Document Identifier

Editor's note: WBXML document identifiers for the invocation and delivery documents have not been registered with WINA yet.

28.3.2. Tag Tokens, Code Page 0

The following token codes represent tags in code page zero (0). All numbers are in hexadecimal.

Tag name	Token
invocation	05
delivery	06
immediate-query-request	07
immediate-query-answer	08
deferred-query-request	09
deferred-query-answer	0A

Tag name	Token
deferred-query-report	0B
deferred-stop-request	0C
deferred-stop-answer	0D
attachment-request	0E
attachment-answer	0F
msids	10
msid	11
application	12
poserr	13
prio	14
recipient-addr	15
result	16
time	17
transaction-id	18
pos	19
pd	1A
altitude	1B
direction	1C
heading	1D
speed	1E
geo-info	1F
coord-datum	20
ref-sys	21
ll-point	22
lat	23
long	24
shape	25
point	26
angle	27
circle	28

Tag name	Token
ellipse	29
rad	2A
semi -minor	2B
semi -major	2C
qop	2D
alt-acc	2E
dir-acc	2F
heading-acc	30
hor-acc	31
speed-acc	32
maxage	33
lev-conf	34
periodic-trigger	35
oneshot-trigger	36
interval	37
start-time	38
stop-time	39

28.3.3. Tag Tokens, Code Page 1

The following token codes represent tags in code page one (1). All numbers are in hexadecimal.

Tag name	Token
msid-range	05
start-msid	06
stop-msid	07
utm-point	08
easting	09
northing	0A
zone	0B
zone-des	0C
circ-arc	0D

Tag name	Token
in-rad	0E
out-rad	0F
polygon	10
start-angle	11
stop-angle	12
geo-code	13

28.3.4. Attribute Start Tokens

The following token codes represent the start of an attribute in code page zero (0). All numbers are in hexadecimal.

Attribute name	Attribute value prefix	Token
msid-type		05
msid-type	PLMN	06
msid-type	IPv4	07
msid-type	IPv6	08
msid-type	PAP-USER	09
encoding		0A
prio-type	normal	0B
prio-type	high	0C
resid		0D
slogan		0E
utc-off		0F
type		10
type	country	11
type	locality	12
type	state-or-province	13
type	street-address	14
type	postal-code	15
coord-sys		16
coord-sys	LL	17

Attribute name	Attribute value prefix	Token
coord-sys	UTM	18
datum		19
datum	WGS-84	1A
name		1B
must-be-satisfied	yes	1C
must-be-satisfied	no	1D

28.3.5. Attribute Value Tokens

This document does not define any attribute value tokens.

28.4. Example

The example below illustrates how a location invocation document can be tokenised.

```
<?xml version = "1.0" ?>
<!DOCTYPE invocation PUBLIC
  "-//WAPFORUM//DTD LOC INV 1.0//EN"
  "http://www.wapforum.org/DTD/loc/invocation-1.0.dtd">

<invocation>
  <deferred-query-request>
    <transaction-id>12345@app.acme.com</transaction-id>
    <msids>
      <msid msid-type="PLMN">+447968025678</msid>
    </msids>
    <recipient-addr>
      http://www.app.com/cgi-bin/getloc.cgi
    </recipient-addr>
    <oneshot-trigger/>
  </deferred-query-request>
</invocation>
```

The tokenised form of the example above (numbers in hexadecimal), using the WBXML encoding defined in this chapter, is found below. This example assumes an UTF-8 character encoding and NULL terminated strings.

In this example, the textual invocation document consists of 408 octets, while the encoded form consists of 93 octets.

Editors note: The token for the Location Invocation Public Identifier is given as ?? and needs to be replaced once WINA has assigned a token (probably 0E).


```

03 ?? 6A 00 45 49 58 03 '1' '2' '3' '4' '5' '@' 'a' 'p'
'p' '.' 'a' 'c' 'm' 'e' '.' 'c' 'o' 'm' 00 01 50 D1 06 01
03 '+' '4' '4' '7' '9' '6' '8' '0' '2' '5' '6' '7' '8' 00 01
01 55 03 'h' 't' 't' 'p' ':' '/' '/' 'w' 'w' 'w' '.' 'a' 'p'
'p' '.' 'c' 'o' 'm' '/' 'c' 'g' 'i' '-' 'b' 'i' 'n' '/' 'g' 'e'
't' 'l' 'o' 'c' '.' 'c' 'g' 'i' 00 01 36 01 01
    
```

In an expanded and annotated form:

<u>Token Stream</u>	<u>Description</u>
03	Version number - WBXML version 1.3
??	Location Invocation 1.0 Public Identifier
6A	Charset=UTF-8 (MIBEnum 106)
00	String table length
45	invocation, with content
49	deferred-query-request, with content
58	transaction-id, with content
03	Inline string follows
'1', '2', '3', '4', '5', '@', 'a', 'p', 'p', '.', 'a', 'c', 'm', 'e', '.', 'c', 'o', 'm', 00	String
01	END (of transaction-id element)
50	msids, with content
D1	msid, with attributes and content
06	msid-type="PLMN"
01	END (of msid attribute list)
03	Inline string follows
+'', '4', '4', '7', '9', '6', '8', '0', '2', '5', '6', '7', '8', 00	String
01	END (of msid element)
01	END (of msids element)
55	recipient-addr, with content
03	Inline string follows
'h', 't', 't', 'p', ':', '/', '/', 'w', 'w', 'w', '.', 'a', 'p', 'p', '.', 'c', 'o', 'm', '/', 'c', 'g', 'i', '-', 'b', 'i', 'n', '/', 'g', 'e', 't', 'l', 'o',	String

<u>Token Stream</u>	<u>Description</u>
`c', `.', `c', `g', `i', 00	
01	END (of recipient-addr element)
36	oneshot-trigger
01	END (of deferred-query-request element)
01	END (of invocation element)

29. Appendix A. Static Conformance Requirements

The notation used in this appendix is specified in [CREQ].

29.1. Location Functionalities in the WAP Client

29.1.1. General Requirements

Item	Function	Reference	Status	Requirement
LOCFORM-GEN-C-001	Parsing of DTDs	10.1	M	
LOCFORM-GEN-C-002	Invalid Values	10.3	O	
LOCFORM-GEN-C-003	Internationalisation	10.4	O	
LOCFORM-GEN-C-004	Transaction ID	10.5	M	
LOCFORM-GEN-C-005	Quality of Position	10.6	M	
LOCFORM-GEN-C-006	Types of Location Information	10.7	M	
LOCFORM-GEN-C-007	Priority	10.8	O	
LOCFORM-GEN-C-008	Version handling	10.2	M	

29.1.2. Invocation Document

Item	Function	Reference	Status	Requirement
LOCFORM-INV-C-001	Support for textual documents	11	O	
LOCFORM-INV-C-002	Support WBXML tokenised documents	28, 11	O	WBXML:MF

29.1.3. Delivery Document

Item	Function	Reference	Status	Requirement
LOCFORM-DEL-C-001	Support for textual documents	12	O	
LOCFORM-DEL-C-002	Support WBXML tokenised documents	28, 12	O	WBXML:MF

29.1.4. Deferred Query Request

Item	Function	Reference	Status	Requirement
LOCFORM-DQRQ-C-001	Deferred query request	15	O	LOCFORM-FUN-C-007 AND LOCFORM-CID-C-001 AND LOCFORM-FUN-C-004 AND LOCFORM-TRI-C-002 AND LOCFORM-LOC-C-008 AND LOCFORM-QOP-C-001

29.1.5. Deferred Query Report

Item	Function	Reference	Status	Requirement
LOCFORM-DQRP-C-001	Deferred query report	17	O	LOCFORM-FUN-C-007 AND LOCFORM-LOC-C-001

29.1.6. Deferred Stop Request

Item	Function	Reference	Status	Requirement
LOCFORM-DSR-C-001	Deferred stop request	18	O	LOCFORM-FUN-C-007

29.1.7. Attachment Request

Item	Function	Reference	Status	Requirement
LOCFORM-AR-C-001	Attachment Request	20	O	LOCFORM-FUN-C-007 AND LOCFORM-LOC-C-008 AND LOCFORM-QOP-C-001

29.1.8. Attachment Answer

Item	Function	Reference	Status	Requirement
LOCFORM-AA-C-001	Attachment answer	21	O	LOCFORM-FUN-C-007 AND LOCFORM-LOC-C-001

29.1.9. Support for Client Address Elements

Item	Function	Reference	Status	Requirement
LOCFORM-CID-C-001	msids	22.2.1	O	LOCFORM-CID-C-002
LOCFORM-CID-C-002	msid	22.2.2	O	
LOCFORM-CID-C-003	msid-range	22.2.3	O	LOCFORM-CID-C-004 AND LOCFORM-CID-C-005
LOCFORM-CID-C-004	start-msid	22.2.4	O	
LOCFORM-CID-C-005	stop-msid	22.2.5	O	

29.1.10. Support for Functional Elements

Item	Function	Reference	Status	Requirement
LOCFORM-FUN-C-001	application	23.2.1	O	
LOCFORM-FUN-C-002	poserr	23.2.2	O	LOCFORM-FUN-C-005 AND LOCFORM-FUN-C-006
LOCFORM-FUN-C-003	prio	23.2.3	O	
LOCFORM-FUN-C-004	recipient-addr	23.2.4	O	
LOCFORM-FUN-C-005	result	23.2.5	O	
LOCFORM-FUN-C-006	time	23.2.6	O	
LOCFORM-FUN-C-007	transaction-id	23.2.7	O	

29.1.11. Support for Location Elements

Item	Function	Reference	Status	Requirement
LOCFORM-LOC-C-001	pos	24.2.1	O	LOCFORM-CID-C-002 AND LOCFORM-LOC-C-002 AND LOCFORM-FUN-C-002
LOCFORM-LOC-C-002	pd	24.2.2	O	LOCFORM-FUN-C-006 AND LOCFORM-SHP-C-001

LOCFORM-LOC-C-003	altitude	24.2.3	O	LOCFORM-QOP-C-002
LOCFORM-LOC-C-004	direction	24.2.4	O	LOCFORM-QOP-C-003
LOCFORM-LOC-C-005	heading	24.2.5	O	LOCFORM-QOP-C-004
LOCFORM-LOC-C-006	geo-code	24.2.6	O	
LOCFORM-LOC-C-007	speed	24.2.7	O	LOCFORM-QOP-C-006
LOCFORM-LOC-C-008	geo-info	24.2.8	O	LOCFORM-LOC-C-009
LOCFORM-LOC-C-009	coord-datum	24.2.9	O	
LOCFORM-LOC-C-010	ref-sys	24.2.10	O	
LOCFORM-LOC-C-011	ll-point	24.2.11	O	LOCFORM-LOC-C-012 AND LOCFORM-LOC-C-013
LOCFORM-LOC-C-012	lat	24.2.12	O	
LOCFORM-LOC-C-013	long	24.2.13	O	
LOCFORM-LOC-C-014	utm-point	24.2.14	O	LOCFORM-LOC-C-015 AND LOCFORM-LOC-C-016 AND LOCFORM-LOC-C-017 AND LOCFORM-LOC-C-018
LOCFORM-LOC-C-015	easting	24.2.15	O	
LOCFORM-LOC-C-016	northing	24.2.16	O	
LOCFORM-LOC-C-017	zone	24.2.17	O	
LOCFORM-LOC-C-018	zone-des	24.2.18	O	

29.1.12. Support for Shape Elements

Item	Function	Reference	Status	Requirement
LOCFORM-SHP-C-001	shape	25.2.1	O	LOCFORM-SHP-C-002 OR LOCFORM-SHP-C-004 OR LOCFORM-SHP-C-005 OR LOCFORM-SHP-C-006 OR LOCFORM-SHP-C-009
LOCFORM-SHP-C-002	point	25.2.2	O	LOCFORM-LOC-C-011
LOCFORM-SHP-C-003	angle	25.2.3	O	
LOCFORM-SHP-C-004	circ-arc	25.2.4	O	LOCFORM-SHP-C-002 AND LOCFORM-SHP-C-007 AND LOCFORM-SHP-C-008 AND LOCFORM-SHP-C-013 AND LOCFORM-SHP-C-014
LOCFORM-SHP-C-005	circle	25.2.5	O	LOCFORM-SHP-C-002 AND LOCFORM-SHP-C-010
LOCFORM-SHP-C-006	ellipse	25.2.6	O	LOCFORM-SHP-C-002 AND LOCFORM-SHP-C-003 AND LOCFORM-SHP-C-011 AND LOCFORM-SHP-C-012
LOCFORM-SHP-C-007	in-rad	25.2.7	O	
LOCFORM-SHP-C-008	out-rad	25.2.8	O	
LOCFORM-SHP-C-009	polygon	25.2.9	O	LOCFORM-SHP-C-002
LOCFORM-SHP-C-010	rad	25.2.10	O	
LOCFORM-SHP-C-011	semi-major	25.2.11	O	

LOCFORM-SHP-C-012	semi-minor	25.2.12	O	
LOCFORM-SHP-C-013	start-angle	25.2.13	O	
LOCFORM-SHP-C-014	stop-angle	25.2.14	O	

29.1.13. Support for QoP Elements

Item	Function	Reference	Status	Requirement
LOCFORM-QOP-C-001	qop	26.2.1	O	LOCFORM-QOP-C-005 AND LOCFORM-QOP-C-007
LOCFORM-QOP-C-002	alt-acc	26.2.2	O	
LOCFORM-QOP-C-003	dir-acc	26.2.3	O	
LOCFORM-QOP-C-004	heading-acc	26.2.4	O	
LOCFORM-QOP-C-005	hor-acc	26.2.5	O	
LOCFORM-QOP-C-006	speed-acc	26.2.6	O	
LOCFORM-QOP-C-007	maxage	26.2.7	O	
LOCFORM-QOP-C-008	lev-conf	26.2.8	O	

29.1.14. Support for Trigger Elements

Item	Function	Reference	Status	Requirement
LOCFORM-TRI-C-001	periodic-trigger	27.2.1	O	LOCFORM-TRI-C-003
LOCFORM-TRI-C-002	oneshot-trigger	27.2.2	O	
LOCFORM-TRI-C-003	interval	27.2.3	O	
LOCFORM-TRI-C-004	start-time	27.2.4	O	
LOCFORM-TRI-C-005	stop-time	27.2.5	O	

29.2. Location Functionalities in the WAP Location Network

29.2.1. General Requirements

Item	Function	Reference	Status	Requirement
LOCFORM-GEN-S-001	Parsing of DTDs	10.1	M	
LOCFORM-GEN-S-002	Invalid Values	10.3	O	
LOCFORM-GEN-S-003	Internationalisation	10.4	M	
LOCFORM-GEN-S-004	Transaction ID	10.5	M	
LOCFORM-GEN-S-005	Quality of Position	10.6	M	
LOCFORM-GEN-S-006	Types of Location Information	10.7	M	
LOCFORM-GEN-S-007	Priority	10.8	O	
LOCFORM-GEN-S-008	Version handling	10.2	M	

29.2.2. Invocation Document

Item	Function	Reference	Status	Requirement
LOCFORM-INV-S-001	Support for textual documents	11	O	
LOCFORM-INV-S-002	Support WBXML tokenised documents	28, 11	O	WBXML:MF

29.2.3. Delivery Document

Item	Function	Reference	Status	Requirement
LOCFORM-DEL-S-001	Support for textual documents	12	O	
LOCFORM-DEL-S-002	Support WBXML tokenised documents	28, 12	O	WBXML:MF

29.2.4. Immediate Query Request

Item	Function	Reference	Status	Requirement
LOCFORM-IQR-S-001	Immediate query request	13	O	LOCFORM-FUN-S-007 AND LOCFORM-CID-S-001 AND LOCFORM-LOC-S-008 AND LOCFORM-QOP-S-001

29.2.5. Immediate Query Answer

Item	Function	Reference	Status	Requirement
LOCFORM-IQA-S-001	Immediate query answer	14	O	LOCFORM-FUN-S-007 AND LOCFORM-LOC-S-001

29.2.6. Deferred Query Request

Item	Function	Reference	Status	Requirement
LOCFORM-DQRQ-S-001	Deferred query request	15	O	LOCFORM-FUN-S-007 AND LOCFORM-CID-S-001 AND LOCFORM-FUN-S-004 AND LOCFORM-TRI-S-002 AND LOCFORM-LOC-S-008 AND LOCFORM-QOP-S-001

29.2.7. Deferred Query Answer

Item	Function	Reference	Status	Requirement
LOCFORM-DQA-S-001	Deferred query answer	16	O	LOCFORM-FUN-S-007 AND LOCFORM-CID-S-002 AND LOCFORM-FUN-S-005

29.2.8. Deferred Query Report

Item	Function	Reference	Status	Requirement
LOCFORM-DQRP-S-001	Deferred query report	17	O	LOCFORM-FUN-S-007 AND LOCFORM-LOC-S-001

29.2.9. Deferred Stop Request

Item	Function	Reference	Status	Requirement
LOCFORM-DSR-S-001	Deferred stop request	18	O	LOCFORM-FUN-S-007

29.2.10. Deferred Stop Answer

Item	Function	Reference	Status	Requirement
LOCFORM-DSA-S-001	Deferred stop answer	19	O	LOCFORM-FUN-S-007 AND LOCFORM-FUN-S-005

29.2.11. Attachment Request

Item	Function	Reference	Status	Requirement
LOCFORM-AR-S-001	Attachment Request	20	O	LOCFORM-FUN-S-007 AND LOCFORM-LOC-S-008 AND LOCFORM-QOP-S-001

29.2.12. Attachment Answer

Item	Function	Reference	Status	Requirement
LOCFORM-AA-S-001	Attachment answer	21	O	LOCFORM-FUN-S-007 AND LOCFORM-LOC-S-001

29.2.13. Support for Client Address Elements

Item	Function	Reference	Status	Requirement
LOCFORM-CID-S-001	Msids	22.2.1	O	LOCFORM-CID-S-002
LOCFORM-CID-S-002	Msid	22.2.2	O	
LOCFORM-CID-S-003	msid-range	22.2.3	O	LOCFORM-CID-S-004 AND LOCFORM-CID-S-005
LOCFORM-CID-S-004	start-msid	22.2.4	O	
LOCFORM-CID-S-005	stop-msid	22.2.5	O	

29.2.14. Support for Functional Elements

Item	Function	Reference	Status	Requirement
LOCFORM-FUN-S-001	Application	23.2.1	O	
LOCFORM-FUN-S-002	Poserr	23.2.2	O	LOCFORM-FUN-S-005 AND LOCFORM-FUN-S-006
LOCFORM-FUN-S-003	Prio	23.2.3	O	
LOCFORM-FUN-S-004	recipient-addr	23.2.4	O	
LOCFORM-FUN-S-005	Result	23.2.5	O	
LOCFORM-FUN-S-006	Time	23.2.6	O	
LOCFORM-FUN-S-007	transaction-id	23.2.7	O	

29.2.15. Support for Location Elements

Item	Function	Reference	Status	Requirement
LOCFORM-LOC-S-001	pos	24.2.1	O	LOCFORM-CID-S-002 AND LOCFORM-LOC-S-002 AND LOCFORM-FUN-S-002
LOCFORM-LOC-S-002	pd	24.2.2	O	LOCFORM-FUN-S-006 AND

				LOCFORM-SHP-S-001
LOCFORM-LOC-S-003	altitude	24.2.3	O	LOCFORM-QOP-S-002
LOCFORM-LOC-S-004	direction	24.2.4	O	LOCFORM-QOP-S-003
LOCFORM-LOC-S-005	heading	24.2.5	O	LOCFORM-QOP-S-004
LOCFORM-LOC-S-006	geo-code	24.2.6	O	
LOCFORM-LOC-S-007	speed	24.2.7	O	LOCFORM-QOP-S-006
LOCFORM-LOC-S-008	geo-info	24.2.8	O	LOCFORM-LOC-S-009
LOCFORM-LOC-S-009	coord-datum	24.2.9	O	
LOCFORM-LOC-S-010	ref-sys	24.2.10	O	
LOCFORM-LOC-S-011	ll-point	24.2.11	O	LOCFORM-LOC-S-012 AND LOCFORM-LOC-S-013
LOCFORM-LOC-S-012	lat	24.2.12	O	
LOCFORM-LOC-S-013	long	24.2.13	O	
LOCFORM-LOC-S-014	utm-point	24.2.14	O	LOCFORM-LOC-S-015 AND LOCFORM-LOC-S-016 AND LOCFORM-LOC-S-017 AND LOCFORM-LOC-S-018
LOCFORM-LOC-S-015	easting	24.2.15	O	
LOCFORM-LOC-S-016	northing	24.2.16	O	
LOCFORM-LOC-S-017	zone	24.2.17	O	
LOCFORM-LOC-S-018	zone-des	24.2.18	O	

29.2.16. Support for Shape Elements

Item	Function	Reference	Status	Requirement
LOCFORM-SHP-S-001	shape	25.2.1	O	LOCFORM-SHP-S-002 OR LOCFORM-SHP-S-004 OR LOCFORM-SHP-S-005 OR LOCFORM-SHP-S-006 OR LOCFORM-SHP-S-009
LOCFORM-SHP-S-002	point	25.2.2	O	LOCFORM-LOC-S-011
LOCFORM-SHP-S-003	angle	25.2.3	O	
LOCFORM-SHP-S-004	circ-arc	25.2.4	O	LOCFORM-SHP-S-002 AND LOCFORM-SHP-S-007 AND LOCFORM-SHP-S-008 AND LOCFORM-SHP-S-013 AND LOCFORM-SHP-S-014
LOCFORM-SHP-S-005	circle	25.2.5	O	LOCFORM-SHP-S-002 AND LOCFORM-SHP-S-010
LOCFORM-SHP-S-006	ellipse	25.2.6	O	LOCFORM-SHP-S-002 AND LOCFORM-SHP-S-003 AND LOCFORM-SHP-S-011 AND LOCFORM-SHP-S-012
LOCFORM-SHP-S-007	in-rad	25.2.7	O	
LOCFORM-SHP-S-008	out-rad	25.2.8	O	
LOCFORM-SHP-S-009	polygon	25.2.9	O	LOCFORM-SHP-S-002
LOCFORM-SHP-S-010	rad	25.2.10	O	

LOCFORM-SHP-S-011	semi-major	25.2.11	O	
LOCFORM-SHP-S-012	semi-minor	25.2.12	O	
LOCFORM-SHP-S-013	start-angle	25.2.13	O	
LOCFORM-SHP-S-014	stop-angle	25.2.14	O	

29.2.17. Support for QoP Elements

Item	Function	Reference	Status	Requirement
LOCFORM-QOP-S-001	qop	26.2.1	O	LOCFORM-QOP-S-005 AND LOCFORM-QOP-S-007
LOCFORM-QOP-S-002	alt-acc	26.2.2	O	
LOCFORM-QOP-S-003	dir-acc	26.2.3	O	
LOCFORM-QOP-S-004	heading-acc	26.2.4	O	
LOCFORM-QOP-S-005	hor-acc	26.2.5	O	
LOCFORM-QOP-S-006	speed-acc	26.2.6	O	
LOCFORM-QOP-S-007	maxage	26.2.7	O	
LOCFORM-QOP-S-008	lev-conf	26.2.8	O	

29.2.18. Support for Trigger Elements

Item	Function	Reference	Status	Requirement
LOCFORM-TRI-S-001	periodic-trigger	27.2.1	O	LOCFORM-TRI-S-003 AND LOCFORM-TRI-S-004 AND LOCFORM-TRI-S-005
LOCFORM-TRI-S-002	oneshot-trigger	27.2.2	O	LOCFORM-TRI-S-004
LOCFORM-TRI-S-003	interval	27.2.3	O	
LOCFORM-TRI-S-004	start-time	27.2.4	O	
LOCFORM-TRI-S-005	stop-time	27.2.5	O	

30. Appendix B. Change History (Informative)

Type of Change	Date	Section	Description
Class 0	2001-09-12		The initial version of this document.