XML Events 2

An Events Syntax for XML

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Abstract

The XML Events module defined in this specification provides XML languages with the ability to uniformly integrate event listeners and associated event handlers with Document Object Model (DOM) Level 3 event interfaces [DOM3EVENTS [p.37]]. The result is to provide an interoperable way of associating behaviors with document-level markup.

Status of This Document

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This document is a Working Draft. It reflects clarifications and corrections as a result of many years of use by the community. It also includes updated implementations in XML Schema and XML DTD that can readily integrate with the host language's namespace. This document should in no way be considered stable, and should not be normatively referenced for any purposes whatsoever. If this document is approved as a W3C Recommendation, it will supersede the 14 October 2003 version of the the XML Events Recommendation.

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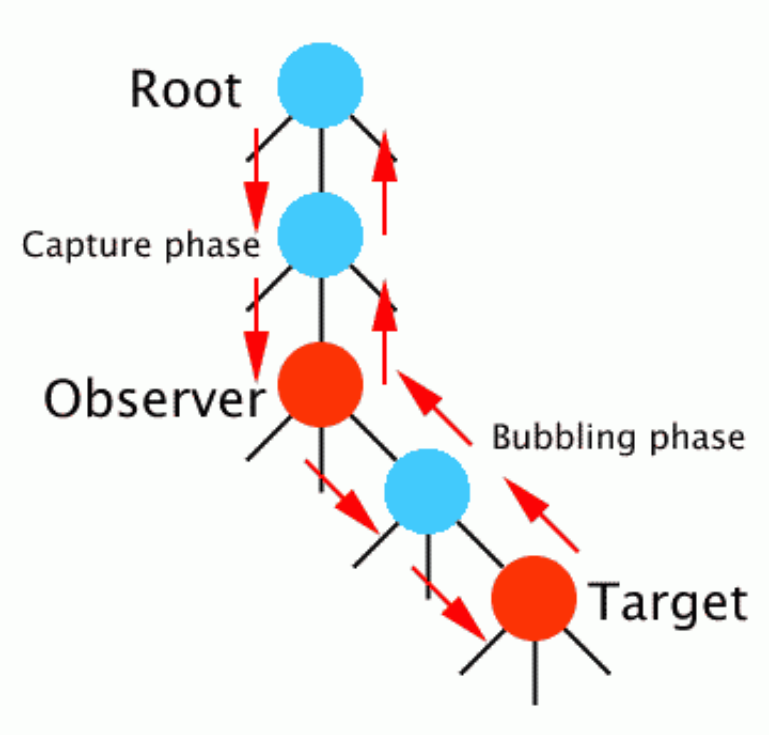
1.Introduction

This section is informative.

An *event* is the representation of some asynchronous occurrence (such as a mouse click on the presentation of the element, or an arithmetical error in the value of an attribute of the element, or any of unthinkably many other possibilities) that gets associated with an element (*targeted* at it) in an XML document.

In the DOM model of events [DOM3EVENTS [p.37]], the general behavior is that when an event occurs it is *dispatched* by passing it down the document tree in a phase called *capture* to the element where the event occurred (called its *target*), where it then may be passed back up the tree again in the phase called *bubbling*. In general an event can be responded to at any element in the path (an *observer*) in either phase by causing an action, and/or by stopping the event, and/or by cancelling the default action for the event. The following diagram illustrates this:



Event flow in DOM3: an event targeted at an element (marked 'target') in the tree passes down the tree from the root to the target in the phase called 'capture'. When it arrives at the target it is in the 'target' (or 'at-target') phase. If the event type allows it, the event then travels back up the tree by the same route in a phase called 'bubbling'. Any node in the route, including the root node and the target, may be an 'observer': that is to say, a handler may be attached to it that is activated when the event passes through in either phase. A handler can only listen for one phase. To listen for both you have to attach two handlers.

An *action* is some way of responding to an event; a *handler* is some specification for such an action, for instance using scripting or some other method. A *listener* is a binding of such a handler to an event targeting some element in a document.

HTML [HTML4 [p.37]] binds events to an element by encoding the event name in an attribute name, such that the value of the attribute is the action for that event at that element. This method has two main disadvantages: firstly it hardwires the events into the language, so that to add a new event, you have to make a change to the language, and secondly it forces you to mix the content of the document with the specifications of the scripting and event handling, rather than allowing you to separate them out. SVG [SVG [p.38]] uses a similar method.

The process of defining XHTML and related markup languages identified the need for an extensible event specification method. The design requirements were the following:

- Syntactically expose the DOM event model to an XML document [XML [p.37]].
- Provide for new event types without requiring modification to the DOM or the DTD.
- Allow for integration with other XML languages.

The DOM specifies an event model that provides the following features:

- A generic event system,
- Means for registering event listeners and handlers,
- Means for routing events through a tree structure,
- Access to context information for each event, and
- A definition of event flow, as sketched above.

The elements and attributes defined in this specification are the method of binding a DOM level 3 event at an element to an event handler. They encapsulate various aspects of the DOM level 3 event interface, thereby providing markup-level specification of the actions to be taken during the various phases of event propagation.

This document neither specifies particular events, nor mandates any particular methods of specifying actions. These definitions are left to any markup language using the facilities described here.

2.Conformance Requirements

This section is *normative*.

The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119 [p.37]].

2.1.Document Conformance

XML Events is not a stand-alone document type. It is intended to be integrated into other host languages such as XHTML. A conforming XML Events document is a document that requires only the facilities described as mandatory in this specification and the facilities described as mandatory in its host language. Such a document must meet all the following criteria:

1. The document MUST conform to the constraints expressed in Appendix B - Schema Implementation [p.31] or Appendix A - DTD Implementation [p.25] , combined with the constraints expressed in its host language implementation.

2. If the host language does not incorporate XML Events elements and attributes into its own namespace, the document MUST contain an `xmlns` declaration for the XML Events namespace [XMLNAMES [p.37]]. The namespace for XML Events is defined to be `http://www.w3.org/2001/xml-events`. An example start tag of a root element might look like:

   ```
   <html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en"
         xmlns:ev="http://www.w3.org/2001/xml-events" >
   ```

   Note that we expect this namespace to revert to the namespace of the previous recommendation once development of this specification is complete.

Chameleon Namespace

This draft is designed to permit "chameleon" use of event elements and attributes. It is not clear what the implications of this would be for implementors.

2.2.Host Language Conformance

When XML Events are included in a host language, all of the facilities required in this specification MUST be included in the host language. In addition, the mandatory elements and attributes defined in this specification MUST be included in the content model of the host language.

2.3.User Agent Conformance

A conforming user agent MUST support all of the features required in this specification.

3.The XML Events Module

This section is normative.

This specification defines a module called XML Events. The XML Events module uses the XML namespace [XMLNAMES [p.37]] identifier `http://www.w3.org/2001/xml-events`.

Examples in this document that use the namespace prefix "`ev`" all assume an `xmlns` declaration `xmlns:ev="http://www.w3.org/2001/xml-events"` somewhere suitable in the document involved. All examples are informative.

The remainder of this section describes the elements and attributes in this module, the semantics, and provides an abstract module definition as required in [XHTMLMOD [p.38]].

The XML Events Module supports the following element and attributes:

Element	Attributes	Minimal Content Model
listener [p.9]	event (QNames), observer (IDREFS), targetid (IDREFS), handler (URI), phase ("bubble" | "capture" | "default"* | "target"), propagate ("stop" | "continue"*), defaultAction ("cancel" | "perform"*), xml:id ([XMLID [p.37]])	EMPTY

Implementations: DTD [p.27] , XML Schema [p.32]

3.1.The listener Element

Element `listener` supports a subset of the DOM's `EventListener` interface. It is used to declare event listeners and register them with specific nodes in the DOM, and has the following attributes:

event
: The required `event` attribute specifies one, or more, event types for which the listener is being registered.

observer
: The optional `observer` attribute specifies the `id` of one, or more, elements with which the event listener is to be registered. If this attribute is not present, the observer is the element that the `event` attribute is on (see later under "Attaching Attributes Directly to the Observer Element [p.12] "), or the parent of that element (see later under "Attaching Attributes Directly to the Handler Element [p.12] ").

targetid
: The optional `targetid` attribute specifies the `id` of one, or more, target elements of the

event (i.e., the node that caused the event). If this attribute is present, only events that match both the `event` and `targetid` attributes will be processed by the associated event handler. Clearly because of the way events propagate, the target element should be a descendent node of the observer element, or the observer element itself.

Use of this attribute requires care; for instance, if you specify

```
<listener event="click" observer="para1"
     targetid="link1" handler="#clicker"/>
```

where 'para1' is some ancestor of the following node

```
<a id="link1" href="doc.html">The <em>draft</em> document</a>
```

and the user happens to click on the word "draft", the `em` element, and not the `a`, will be the target, and so the handler will not be activated; to catch all mouse clicks on the `a` element and its children, use `observer="link1"`, and no `targetid` attribute.

handler

The optional `handler` attribute specifies the URI reference of a resource that defines the action that should be performed if the event reaches the observer. (This specification does not mandate what form that element should take: see further the section "Event Handlers [p.??] "). If this attribute is not present, the handler is the element that the `event` attribute is on (see later under "Attaching Attributes Directly to the Handler Element [p.12] ").

phase

The optional `phase` attribute specifies when (during which DOM 3 event propagation phase) the listener will be activated by the desired event.

`bubble`
: Listener is activated during the bubbling and target phases.

`capture`
: Listener is activated during capturing phase.

`default`
: Listener is activated during bubbling or target phases.

`target`
: Listener is activated only during the target phase.

The default behavior is `phase="default"`.

Note that not all events bubble, in which case with phase="default" you can only handle the event by making the event's target the observer.

propagate

The optional `propagate` attribute specifies whether after processing all listeners at the current node, the event is allowed to continue on its path (either in the capture or the bubble phase).

`stop`
: event propagation stops

`continue`
: event propagation continues (unless stopped by other means, such as scripting, or by another listener).

The default behavior is `propagate="continue"`.

defaultAction
: The optional `defaultAction` attribute specifies whether after processing of all listeners for the event, the default action for the event (if any) should be performed or not. For instance, in XHTML the default action for a mouse click on an `a` element or one of its descendents is to traverse the link.

`cancel`
: if the event type is cancelable, the default action is cancelled

`perform`
: the default action is performed (unless cancelled by other means, such as scripting, or by another listener).

The default value is `defaultAction="perform"`.

Note that not all events are cancelable, in which case this attribute is ignored.

Note that `observer = "<element-id>"` and `event = "<event-type>"` are similar to the `begin = "<element-id>.<event-type>"` attribute in SMIL EventTiming [SMIL20 [p.38]].

3.1.1.Examples of listener Usage

1. This example attaches the handler in the element at `"#doit"` that will get activated when the event called `activate` occurs on the element with `id="button1"`, or any of its children. The activation will occur during bubbling, or if the event happened on the observer element itself, when the event reaches the element (phase *target*).

```
<listener event="DOMActivate" observer="button1" handler="#doit"/>
```

2. This attaches the handler at `#overflow-handler` that will get activated when the event `overflow` occurs on the element with `id="expr1"` and bubbles up to the element with `id="prog1"`.

```
<listener event="overflow" observer="prog1" targetid="expr1"
        handler="#overflow-handler"/>
```

3. This attaches the handler at `#popup` that will get activated whenever an `activate` event occurs at the element with `id="embargo"` or any of its children. Since it will be activated during the capture phase, and propagation is stopped, this will have the effect (regardless of what the handler does) of preventing any child elements of the `embargo` element seeing any `activate` events.

```
<listener event="DOMActivate" observer="embargo" handler="#popup"
        phase="capture" propagate="stop"/>
```

4. This attaches a handler from another document.

```
<listener event="DOMActivate" observer="image1"
    handler="/handlers/events.xml#activate"/>
```

3.2.Attaching Attributes Directly to the Observer Element

All the attributes from the `listener` element with the exception of `id` may be used as global attributes, as defined in *Namespaces in XML* [XMLNAMES [p.37]], to attach the attributes to other elements. *In the schema implementations, this is done by defining the attribute collection `XMLEvents`.*

Note that this means that the `listener` element is strictly speaking redundant, since the following

```
<anyelement ev:event="click" ev:observer="button1" ev:handler="#clicker"/>
```

would have the same effect as

```
<ev:listener event="click" observer="button1" handler="#clicker"/>
```

Nonetheless, for utility the `listener` element has been retained.

If the `observer` attribute is omitted (but not the `handler` attribute), then the element that the other attributes are attached to is the observer element.

3.2.1. Examples of Using Attributes Attached to an Observer Element

1. This first example will attach the handler identified by `"#popper"` to the `a` element, and cancel the default action for the event.

```
<a href="doc.html" ev:event="DOMActivate" ev:handler="#popper"
   ev:defaultAction="cancel">The document</a>
```

2. This will attach the handler at `#handle-overflow` for the event `overflow` to the current element.

```
<div ev:event="overflow" ev:handler="#handle-overflow"> ... </div>
```

3.3.Attaching Attributes Directly to the Handler Element

If, when attaching the global attributes to an element, the `handler` attribute is omitted then the element that the other attributes are attached to is the handler element.

Note that, since the `observer` and `targetid` attributes are IDREFs, in this case the handler and observer/target elements must be in the same document (while in other cases, since the `handler` attribute is a URI, the handler element may be in another document).

If the `observer` attribute is also omitted, then the parent of the handler element is the observer element.

3.3.1. Examples of Using Attributes Attached to a Handler Element

1. In this case the element is the handler for the `submit` event on the element with `id="form1"`.

```
<script type="application/x-javascript"
        ev:event="submit" ev:observer="form1">
   return docheck(event);
</script>
```

2. In this case the `action` element is the handler for event `q-submit`, and the observer is the `questionnaire` element.

```
<questionnaire submissionURL="/q/tally">
    <action ev:event="q-submit">
      ...
    </action>
    ...
 </questionnaire>
```

3. The `script` element is the handler for event `click`; the `img` element is the observer.

```
<img src="button.gif" alt="OK">
    <script ev:event="DOMActivate" type="application/x-javascript">
        doactivate(event);
    </script>
</img>
```

4. The `onevent` element is the handler for event `enterforward`. The `card` element is the observer.

```
<card>
    <onevent ev:event="enterforward">
        <go href="/url"/>
    </onevent>
    <p>
      Hello!
    </p>
</card>
```

5. The `catch` element is the handler for the `nomatch` event. The observer is the `field` element.

```
<form id="launch_missiles">
  <field name="password">
    <prompt>What is the code word?</prompt>
    <grammar>
      <rule id="root" scope="public">rutabaga</rule>
    </grammar>
    <help>It is the name of an obscure vegetable.</help>
    <catch ev:event="nomatch">
      <prompt>Security violation!</prompt>
      <submit next="apprehend_felon" namelist="user_id"/>
    </catch>
  </field>
  <block>
    <goto next="#get_city"/>
  </block>
</form>
```

6. This example shows three handlers for different events. The observer for all three is the `secret` element.

```
<secret ref="/login/password">
    <caption>Please enter your password</caption>
    <info ev:event="help">
        Mail help@example.com in case of problems
    </info>
    <info ev:event="hint">
        A pet's name
    </info>
    <info ev:event="alert">
        This field is required
    </info>
</secret>
```

3.4.Summary of Observer and Handler Attribute Defaulting

The following table summarizes which elements play the role of observer or handler if the relevant attribute is omitted.

The effect of omitted observer and handler attributes

	Handler present	**Handler omitted**
Observer present	(As declared)	Element is handler
Observer omitted	Element is observer	Element is handler Parent is observer

4.The XML Handlers Module

This section is normative.

This specification also defines a module called XML Handlers. The XML Handlers module also uses the XML namespace [XMLNAMES [p.37]] identifier `http://www.w3.org/2001/xml-events`.

The purpose of this module is to provide a declarative way to map specific events to a series of one or more actions. Those actions are declared either by the host language (e.g., [XFORMS [p.38]]) or within the document using the XML Events module above. Implementing actual handlers for the events remains the purview of the host language, supported scripting languages, etc.

The XML Handlers Module supports the following elements and attributes:

Element	Attributes	Minimal Content Model

action [p.16]	event (QNames),
	targetid (IDREFS),
	declare ("declare"),
	if (XPathExpression [p.23]),
	while (XPathExpression [p.23]),
	xml:id ([XMLID [p.37]])
		(action | script | dispatchEvent | addEventListener | removeEventListener | stopPropagation | preventDefault)+

script [p.17]	encoding (Charset), implements (URIorSafeCURIEs), src (URI), type (ContentTypes), xml:id ([XMLID [p.37]])	PCDATA
dispatchEvent [p.18]	raise (QName), to (IDREF), bubbles ("bubbles"), cancelable ("cancelable"), xml:id ([XMLID [p.37]])	EMPTY
addEventListener [p.18]	event* (QName), handler* (IDREF), phase ("bubble" | "capture" | "default"* | "target"), xml:id ([XMLID [p.37]])	EMPTY
removeEventListener [p.18]	event* (QName), handler* (IDREF), phase ("bubble" | "capture" | "default"* | "target"), xml:id ([XMLID [p.37]])	EMPTY
stopPropagation [p.18]	event* (QName), xml:id ([XMLID [p.37]])	EMPTY
preventDefault [p.19]	event* (QName), xml:id ([XMLID [p.37]])	EMPTY

Implementations: DTD [p.28] , XML Schema [p.34]

4.1.The action Element

The `action` element is used to group event handler elements (including other `action` elements) that will act *in sequence* as handlers for an event. The `action` element takes the following attributes:

event
: The required `event` attribute specifies one, or more, event types this action will handle.

targetid
: The optional `targetid` attribute specifies the `id` of one, or more, target elements of the event (i.e., the node that caused the event). If this attribute is present, only events that match both the `event` and `targetid` attributes will be processed. Clearly because of the way events propagate, the target element should be a descendant node of the observer element, or the observer element itself.

declare
: When present, this boolean attribute makes the current element (and any elements it may contain) a declaration only.

if
: The optional if attribute allows a condition to be specified. This condition must be met in order for the event handler to be activated. The condition is specified using an XPath Expression [p.23] . There is no default value.

  This attribute allows event handlers to be specified that respond not just to named events, but to more specific conditions, such as a mouse click with the control key pressed:

```
<action event="click" if="event('ctrlKey') = true()">
 . . .
</action>
```

  The event function is described in XPath Event Function [p.23] .

while
: The optional while attribute allows a condition to be specified. This condition must be met in order for the event handler to be activated. The condition is specified using an XPath Expression [p.23] . There is no default value.

  This attribute allows event handlers to be specified that perform their action whilst some condition remains true.

  EDITORS' NOTE: Can't think of an example that only makes use of what we have in this spec, i.e., the event() function. We may need to do something like delete a list in XForms.

4.2.The script Element

The `script` element contains or references *scripts* that may register one or more event handlers for a document through a *scripting language* that is supported by the implementation.

implements
: The optional `implements` indicates that the script provides an implementation of the feature or features specified in this attribute. The script should only be loaded and used if the user agent does not have an implementation of the specified feature.

The event handler(s) may be defined within the contents of the `script` element or in an external file. If the `src` attribute is not set, user agents MUST interpret the contents of the element as the handler. If the `src` has a URI value, user agents MUST ignore the element's contents and retrieve the handler via the URI.

Note that the `encoding` attribute refers to the character encoding of the handler designated by the `src` attribute; it does not concern the content of the `script` element. Also note that the `type` attribute can be used to specify a list of available implementations for the `script`, allowing the user agent to choose among them (see `type` for more details).

4.3.The dispatchEvent Element

The `dispatchEvent` element triggers the event identified by the `raise` attribute, delivering it to the element identified by the `to` attribute.

The `dispatchEvent` element also defines two additional attributes:

bubbles
: Optional boolean indicating if this event bubbles as defined in [DOM3EVENTS [p.37]]. The default value will depend on the actual event being dispatched.

cancelable
: Optional boolean indicating if this event is cancelable as defined in [DOM3EVENTS [p.37]]. The default value will depend on the actual event being dispatched.

to
: The IDREF of the element to which the event is dispatched. If this is not specified, it defaults to the parent of the `dispatchEvent` element

raise
: The QName of the event to be triggered.

4.4.The addEventListener element

This element allows the registration of a listener on a specific event, as defined in [DOM3EVENTS [p.37]].

4.5.The removeEventListener element

The `removeEventListener` element de-registers the handler identified by the required `handler` attribute for the event identified by the required `event` attribute.

4.6.The stopPropagation element

The `stopPropagation` element is used to prevent further propagation of an event during event flow. If this is called by any EventListener the event will cease propagating through the tree. The event will complete dispatch to all listeners on the current EventTarget before event flow stops. This action may be used during any stage of event flow.

4.7.The preventDefault element

If an event is cancelable, the `preventDefault` action is used to signify that the event is to be canceled, meaning any default action normally taken by the implementation as a result of the event will not occur. If, during any stage of event flow, the `preventDefault` action is called the event is canceled. Any default action associated with the event will not occur. Calling this action for a non-cancelable event has no effect. Once preventDefault has been called it will remain in effect throughout the remainder of the event's propagation. This action may be used during any stage of event flow.

5.Naming Event Types

This section is informative.

This specification does not normatively specify how language designers should name events (i.e., the values used in the `event` attribute).

However, future versions of DOM Events are likely to allow namespaced event names, so language designers are advised not to use the colon character ":" in event names.

A number of event types are defined in DOM 3 Events [DOM3EVENTS [p.37]], to which you should refer for their names and semantics.

6.XPath Expressions

XML Events uses XPath expressions to specify conditionals (if [p.17] , while [p.17]). As described in section 1 of [XPATH [p.37]], each XPath expression is evaluated within a context, which is made up of:

- a node (the context node)
- a pair of non-zero positive integers (the context position and the context size)
- a set of variable bindings
- a function library
- the set of namespace declarations in scope for the expression

XML Events XPath expressions have no context node, and so the context position is 0 and the context size is 0. There are no variable bindings, and the function library contains the functions described below. It is not necessary to provide namespace declarations.

EDITORS' NOTE: If any compelling use cases arise we will look at allowing context to be specified.

Host languages that import XML Events may provide a richer context, and MUST specify whether their context is the same as that provided here, or more.

6.1.Function Library

The XPath function library consists of the following functions:

- event

6.1.1.XPath event Function

```
object event(string)
```

Function `event` returns the value of a property of the current event object, as determined by the string argument. The value returned will be typed, depending on the property. For example, the MouseEvent interface [DOM3EVENTS [p.37]] has the attribute `shiftKey`, which is a `boolean`. This can be accessed by passing the string value '`shiftKey`' to the event function. The result will be an XPath boolean.

A.DTD Implementation

This appendix is *normative*.

The DTD implementation of XML Events conforms to the requirements defined in [XHTMLMOD [p.38]]. Consequently, it provides a Qualified Names sub-module, and a module file for the XML Events module defined in this Proposed Recommendation.

A.1.Qualified Names Module

Note that this module defines the parameter entity `%xml-events-attrs.qname;`. This entity is intended to be used in the attribute lists of elements in any host language that permits the use of event attributes on elements in its own namespace. In this case the Host Language driver should set a parameter entity `%XML-EVENTS.prefixed;` to `INCLUDE` and a parameter entity `%XML-EVENTS.prefix;` to a value that is the prefix for the XML Events attributes.

```
<!-- ....................................................................... -->
<!-- XML Events Qname Module  ..................................... -->
<!-- file: xml-events-qname-2.mod

     This is XML Events - the Events Module for XML,
     a definition of access to the DOM events model.

     Copyright 2000-2007 W3C (MIT, ERCIM, Keio), All Rights Reserved.

     This DTD module is identified by the PUBLIC and SYSTEM identifiers:

       PUBLIC "-//W3C//ENTITIES XML Events Qnames 2.0//EN"
       SYSTEM "http://www.w3.org/MarkUp/DTD/xml-events-qname-2.mod"

     Revisions:
     (none)
     ....................................................................... -->

<!-- XML Events Qname (Qualified Name) Module

     This module is contained in two parts, labeled Section 'A' and 'B':

       Section A declares parameter entities to support namespace-
       qualified names, namespace declarations, and name prefixing
       for XML Events and extensions.

       Section B declares parameter entities used to provide
       namespace-qualified names for all XML Events element types:

         %listener.qname;   the xmlns-qualified name for <listener>
         ...

     XML Events extensions would create a module similar to this one.
     Included in the XML distribution is a template module
     ('template-qname-2.mod') suitable for this purpose.
-->

<!-- Section A: XML Events XML Namespace Framework :::::::::::::::::::: -->
```

```
<!-- 1. Declare a %XML-EVENTS.prefixed; conditional section keyword, used
        to activate namespace prefixing. The default value should
        inherit '%NS.prefixed;' from the DTD driver, so that unless
        overridden, the default behavior follows the overall DTD
        prefixing scheme.
-->
<!ENTITY % NS.prefixed "IGNORE" >
<!ENTITY % XML-EVENTS.prefixed "%NS.prefixed;" >

<!-- 2. Declare a parameter entity (eg., %XML-EVENTS.xmlns;) containing
        the URI reference used to identify the XML Events namespace
-->
<!ENTITY % XML-EVENTS.xmlns  "http://www.w3.org/2001/xml-events" >

<!-- 3. Declare parameter entities (eg., %XML.prefix;) containing
        the default namespace prefix string(s) to use when prefixing
        is enabled. This may be overridden in the DTD driver or the
        internal subset of an document instance. If no default prefix
        is desired, this may be declared as an empty string.

     NOTE: As specified in [XMLNAMES], the namespace prefix serves
     as a proxy for the URI reference, and is not in itself significant.
-->
<!ENTITY % XML-EVENTS.prefix  "" >

<!-- 4. Declare parameter entities (eg., %XML-EVENTS.pfx;) containing the
        colonized prefix(es) (eg., '%XML-EVENTS.prefix;:') used when
        prefixing is active, an empty string when it is not.
-->
<![%XML-EVENTS.prefixed;[
<!ENTITY % XML-EVENTS.pfx  "%XML-EVENTS.prefix;:" >
]]>
<!ENTITY % XML-EVENTS.pfx  "" >

<!-- declare qualified name extensions here ............ -->
<!ENTITY % xml-events-qname-extra.mod "" >
%xml-events-qname-extra.mod;

<!-- 5. The parameter entity %XML-EVENTS.xmlns.extra.attrib; may be
        redeclared to contain any non-XML Events namespace declaration
        attributes for namespaces embedded in XML. The default
        is an empty string.  XLink should be included here if used
        in the DTD.
-->
<!ENTITY % XML-EVENTS.xmlns.extra.attrib "" >


<!-- Section B: XML Qualified Names ::::::::::::::::::::::::::::: -->

<!-- 6. This section declares parameter entities used to provide
        namespace-qualified names for all XML Events element types.
-->

<!ENTITY % xml-events.listener.qname  "%XML-EVENTS.pfx;listener" >


<!ENTITY % xml-handlers.action.qname  "%XML-EVENTS.pfx;action" >
<!ENTITY % xml-handlers.script.qname  "%XML-EVENTS.pfx;script" >
<!ENTITY % xml-handlers.dispatchEvent.qname  "%XML-EVENTS.pfx;dispatchEvent" >
<!ENTITY % xml-handlers.addEventListener.qname  "%XML-EVENTS.pfx;addEventListener" >
<!ENTITY % xml-handlers.removeEventListener.qname  "%XML-EVENTS.pfx;removeEventListener" >
```

```
<!ENTITY % xml-handlers.stopPropagation.qname  "%XML-EVENTS.pfx;stopPropagation" >
<!ENTITY % xml-handlers.preventDefault.qname  "%XML-EVENTS.pfx;preventDefault" >


<!-- The following defines a PE for use in the attribute sets of elements in
     other namespaces that want to incorporate the XML Event attributes. Note
     that in this case the XML-EVENTS.pfx should always be defined. -->

<!ENTITY % xml-events.attrs.qname
   "%XML-EVENTS.pfx;event            NMTOKEN      #IMPLIED
    %XML-EVENTS.pfx;observer         IDREF        #IMPLIED
    %XML-EVENTS.pfx;target           IDREF        #IMPLIED
    %XML-EVENTS.pfx;handler          %URI.datatype;        #IMPLIED
    %XML-EVENTS.pfx;phase            (capture|default) #IMPLIED
    %XML-EVENTS.pfx;propagate        (stop|continue) #IMPLIED
    %XML-EVENTS.pfx;defaultAction    (cancel|perform) #IMPLIED
    %XML-EVENTS.pfx;condition        CDATA        #IMPLIED"
    >

<!-- end of xml-events-qname-2.mod -->
```

A.2.XML Events Module

```
<!-- ....................................................................... -->
<!-- XML Events Module ..................................................... -->
<!-- file: xml-events-2.mod

     This is XML Events - the Events Module for XML.
     a redefinition of access to the DOM events model.

     Copyright 2000-2007 W3C (MIT, ERCIM, Keio), All Rights Reserved.

     This DTD module is identified by the PUBLIC and SYSTEM identifiers:

       PUBLIC "-//W3C//ENTITIES XML Events 2.0//EN"
       SYSTEM "http://www.w3.org/MarkUp/DTD/xml-events-2.mod"

     Revisions:
     (none)
     ....................................................................... -->


<!-- XML Events defines the listener element and its attributes -->

<!ENTITY % xml-events.listener.content "EMPTY" >

<!ELEMENT %xml-events.listener.qname; %xml-events.listener.content;>
<!ATTLIST %xml-events.listener.qname;
    xml:id           ID           #IMPLIED
    event            NMTOKEN      #REQUIRED
    observer         IDREF        #IMPLIED
    targetid         IDREF        #IMPLIED
    handler          %anyURI.datatype;        #IMPLIED
    phase            (capture|default) #IMPLIED
    propagate        (stop|continue) #IMPLIED
```

```
    defaultAction    (cancel|perform)  #IMPLIED
>

<!-- end of xml-events-2.mod -->
```

A.3.XML Handlers Module

```
<!-- ..................................................................... -->
<!-- XML Handlers Module .................................................. -->
<!-- file: xml-handlers-2.mod

     This is XML Handlers - the Handlers Module for XML.
     a redefinition of support for handlers of the DOM event model.

     Copyright 2007 W3C (MIT, ERCIM, Keio), All Rights Reserved.

     This DTD module is identified by the PUBLIC and SYSTEM identifiers:

       PUBLIC "-//W3C//ENTITIES XML Handlers 2.0//EN"
       SYSTEM "http://www.w3.org/MarkUp/DTD/xml-handlers-2.mod"

     Revisions:
     (none)
     ..................................................................... -->


<!-- XML Handlers defines the various element and attributes -->

<!ENTITY % xml-handlers.action.content
    "( %xml-handlers.action.qname; |
       %xml-handlers.script.qname; |
       %xml-handlers.dispatchevent.qname; |
       %xml-handlers.addEventListener.qname; |
       %xml-handlers.removeEventListener.qname; |
       %xml-handlers.stopPropagation.qname; |
       %xml-handlers.preventDefault.qname; |
       %xml-handlers.action.extras; )+ "
>

<!ELEMENT %xml-handlers.action.qname; %xml-handlers.action.content;>
<!ATTLIST %xml-handlers.action.qname;
    xml:id           ID                   #IMPLIED
    event            %QName.datatype;     #IMPLIED
    targetid         IDREF                #IMPLIED
    declare          ( declare )          #IMPLIED
    if               CDATA                #IMPLIED
    while            CDATA                #IMPLIED
>

<!ENTITY % xml-handlers.script.content "( #PCDATA )" >
<!ELEMENT %xml-handlers.script.qname; %xml-handlers.script.content; >
<!ENTITY % xml-handlers.script.attlist  "INCLUDE" >
<![%xml-handlers.script.attlist;[
<!ATTLIST %xml-handlers.script.qname;
      %XML-EVENTS.xmlns.attrib;
      xml:id       ID                      #IMPLIED
```

```
      encoding     %Charset.datatype;       #IMPLIED
      type         %ContentType.datatype;   #REQUIRED
      src          %URI.datatype;           #IMPLIED
      implements   %URIorSafeCURIEs.datatype;  #IMPLIED
>
<!-- end of xml-handlers.script.attlist -->]]>

<!ENTITY % xml-handlers.dispatchEvent.content "NONE" >
<!ELEMENT %xml-handlers.dispatchEvent.qname;
          %xml-handlers.dispatchEvent.content >

<ENTITY % xml-handlers.dispatchEvent.attlist "INCLUDE" >
<![%xml-handlers.dispatchEvent.attlist;[
<!ATTLIST %xml-handlers.dispatchEvent.qname;
      %XML-EVENTS.xmlns.attrib;
      xml:id       ID                       #IMPLIED
      to           IDREF                    #IMPLIED
      raise        %QName.datatype;         #IMPLIED
      bubbles      ( bubbles )              #IMPLIED
      cancelable   ( cancelable )           #IMPLIED
>
<!-- end of xml-handlers.dispatchEvent.attlist -->]]>

<!ENTITY % xml-handlers.addEventListener.content "NONE" >
<!ELEMENT %xml-handlers.addEventListener.qname;
          %xml-handlers.addEventListener.content >

<ENTITY % xml-handlers.addEventListener.attlist "INCLUDE" >
<![%xml-handlers.addEventListener.attlist;[
<!ATTLIST %xml-handlers.addEventListener.qname;
      %XML-EVENTS.xmlns.attrib;
      xml:id       ID                       #IMPLIED
      event        %QName.datatype;         #REQUIRED
      handler      IDREF                    #REQUIRED
      phase        (capture|default)        #IMPLIED
>
<!-- end of xml-handlers.addEventListener.attlist -->]]>

<!ENTITY % xml-handlers.removeEventListener.content "NONE" >
<!ELEMENT %xml-handlers.removeEventListener.qname;
          %xml-handlers.removeEventListener.content >

<ENTITY % xml-handlers.removeEventListener.attlist "INCLUDE" >
<![%xml-handlers.removeEventListener.attlist;[
<!ATTLIST %xml-handlers.removeEventListener.qname;
      %XML-EVENTS.xmlns.attrib;
      xml:id       ID                       #IMPLIED
      event        %QName.datatype;         #REQUIRED
      handler      IDREF                    #REQUIRED
      phase        (capture|default)        #IMPLIED
>
<!-- end of xml-handlers.addEventListener.attlist -->]]>

<!ENTITY % xml-handlers.stopPropagation.content "NONE" >
<!ELEMENT %xml-handlers.stopPropagation.qname;
          %xml-handlers.stopPropagation.content >
```

```
<ENTITY % xml-handlers.stopPropagation.attlist "INCLUDE" >
<![%xml-handlers.stopPropagation.attlist;[
<!ATTLIST %xml-handlers.stopPropagation.qname;
      %XML-EVENTS.xmlns.attrib;
      xml:id       ID                       #IMPLIED
      event        %QName.datatype;         #REQUIRED
>
<!-- end of xml-handlers.stopPropagation.attlist -->]]>

<!ENTITY % xml-handlers.preventDefault.content "NONE" >
<!ELEMENT %xml-handlers.preventDefault.qname;
          %xml-handlers.preventDefault.content >

<ENTITY % xml-handlers.preventDefault.attlist "INCLUDE" >
<![%xml-handlers.preventDefault.attlist;[
<!ATTLIST %xml-handlers.preventDefault.qname;
      %XML-EVENTS.xmlns.attrib;
      xml:id       ID                       #IMPLIED
      event        %QName.datatype;         #REQUIRED
>
<!-- end of xml-handlers.preventDefault.attlist -->]]>

<!-- end of xml-handlers-2.mod -->
```

B.Schema Implementation

This appendix is *normative*.

The schema implementation of XML Events conforms to the requirements defined in [XHTMLSCHEMAMOD [p.38]]. It is divided into an attributes module and an element module for the XML Events module defined in this Proposed Recommendation.

B.1.Attributes Module

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema
    targetNamespace="http://www.w3.org/2001/xml-events"
    xmlns:ev="http://www.w3.org/2001/xml-events"
    xmlns:xs="http://www.w3.org/2001/XMLSchema"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.w3.org/2001/XMLSchema
                        http://www.w3.org/2001/XMLSchema.xsd"
    elementFormDefault="unqualified"
    blockDefault="#all"
    finalDefault="#all"
    attributeFormDefault="unqualified">

  <xs:annotation>
    <xs:documentation>
      This is the XML Schema for XML Events global attributes

      URI: http://www.w3.org/MarkUp/SCHEMA/xml-events-attribs-2.xsd
      $Id: xml-events.ps,v 1.2 2008/06/04 20:48:31 smccarro Exp $
    </xs:documentation>
    <xs:documentation source="xml-events-copyright-2.xsd"/>
  </xs:annotation>

  <xs:annotation>
    <xs:documentation>
      XML Event Attributes

        These "global" event attributes are defined in "Attaching
        Attributes Directly to the Observer Element" of the XML
        Events specification.
    </xs:documentation>
  </xs:annotation>

  <xs:attribute name="event" type="xs:NMTOKEN"/>
  <xs:attribute name="observer" type="xs:IDREF"/>
  <xs:attribute name="targetid" type="xs:IDREF"/>
  <xs:attribute name="handler" type="xs:anyURI"/>
  <xs:attribute name="phase" default="default">
    <xs:simpleType>
      <xs:restriction base="xs:NMTOKEN">
        <xs:enumeration value="bubble"/>
        <xs:enumeration value="capture"/>
        <xs:enumeration value="default"/>
        <xs:enumeration value="target"/>
```

```
      </xs:restriction>
    </xs:simpleType>
  </xs:attribute>
  <xs:attribute name="propagate" default="continue">
    <xs:simpleType>
      <xs:restriction base="xs:NMTOKEN">
        <xs:enumeration value="stop"/>
        <xs:enumeration value="continue"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:attribute>
  <xs:attribute name="defaultAction" default="perform">
    <xs:simpleType>
      <xs:restriction base="xs:NMTOKEN">
        <xs:enumeration value="cancel"/>
        <xs:enumeration value="perform"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:attribute>

  <xs:attributeGroup name="XmlEvents.attlist">
    <xs:attribute ref="ev:event"/>
    <xs:attribute ref="ev:observer"/>
    <xs:attribute ref="ev:targetid"/>
    <xs:attribute ref="ev:handler"/>
    <xs:attribute ref="ev:phase"/>
    <xs:attribute ref="ev:propagate"/>
    <xs:attribute ref="ev:defaultAction"/>
  </xs:attributeGroup>

</xs:schema>
```

B.2.XML Events Module

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema
    targetNamespace="http://www.w3.org/2001/xml-events"
    xmlns="http://www.w3.org/2001/xml-events"
    xmlns:xs="http://www.w3.org/2001/XMLSchema"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.w3.org/2001/XMLSchema
                        http://www.w3.org/2001/XMLSchema.xsd"
    elementFormDefault="unqualified"
    blockDefault="#all"
    finalDefault="#all"
    attributeFormDefault="unqualified">

  <xs:annotation>
    <xs:documentation>
      This is the XML Schema for XML Events

      URI: http://www.w3.org/MarkUp/SCHEMA/xml-events-2.xsd
      $Id: xml-events.ps,v 1.2 2008/06/04 20:48:31 smccarro Exp $
    </xs:documentation>
    <xs:documentation source="xml-events-copyright-2.xsd"/>
  </xs:annotation>
```

```
  <xs:annotation>
    <xs:documentation>
      XML Events element listener

        This module defines the listener element for XML Events.
        This element can be used to define event listeners. This
        module relies upon the XmlEvents.attlist attribute group
        defined in xml-events-attribs-2.xsd.
    </xs:documentation>
  </xs:annotation>

  <xs:attributeGroup name="listener.attlist">
    <xs:attribute name="event" use="required" type="xs:NMTOKEN"/>
    <xs:attribute name="observer" type="xs:IDREF"/>
    <xs:attribute name="target" type="xs:IDREF"/>
    <xs:attribute name="handler" type="xs:anyURI"/>
    <xs:attribute name="phase" default="default">
      <xs:simpleType>
        <xs:restriction base="xs:NMTOKEN">
          <xs:enumeration value="capture"/>
          <xs:enumeration value="default"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:attribute>
    <xs:attribute name="propagate" default="continue">
      <xs:simpleType>
        <xs:restriction base="xs:NMTOKEN">
          <xs:enumeration value="stop"/>
          <xs:enumeration value="continue"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:attribute>
    <xs:attribute name="defaultAction" default="perform">
      <xs:simpleType>
        <xs:restriction base="xs:NMTOKEN">
          <xs:enumeration value="cancel"/>
          <xs:enumeration value="perform"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:attribute>
    <xs:attribute name="id" type="xs:ID"/>
  </xs:attributeGroup>

  <xs:complexType name="listener.type">
    <xs:attributeGroup ref="listener.attlist"/>
  </xs:complexType>

  <xs:element name="listener" type="listener.type"/>

</xs:schema>
```

B.3.XML Handlers Module

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema
    targetNamespace="http://www.w3.org/2001/xml-events"
    xmlns="http://www.w3.org/2001/xml-events"
    xmlns:xh11d="http://www.w3.org/1999/xhtml/datatypes/"
    xmlns:xs="http://www.w3.org/2001/XMLSchema"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.w3.org/2001/XMLSchema
                        http://www.w3.org/2001/XMLSchema.xsd"
    elementFormDefault="unqualified"
    blockDefault="#all"
    finalDefault="#all"
    attributeFormDefault="unqualified">

  <xs:annotation>
    <xs:documentation>
      This is the XML Schema for XML Events

      URI: http://www.w3.org/MarkUp/SCHEMA/xml-handlers-2.xsd
      $Id: xml-events.ps,v 1.2 2008/06/04 20:48:31 smccarro Exp $
    </xs:documentation>
    <xs:documentation source="xml-events-copyright-2.xsd"/>
  </xs:annotation>

  <xs:attributeGroup name="action.attlist">
    <xs:attribute name="event" use="required" type="xs:QName"/>
    <xs:attribute name="targetid" type="xs:IDREF"/>
    <xs:attribute name="declare">
        <xs:simpleType>
            <xs:restriction base="xs:NMTOKEN">
                <xs:enumeration value="declare"/>
            </xs:restriction>
        </xs:simpleType>
    </xs:attribute>
    <xs:attribute name="if" type="xs:normalizedString"/>
    <xs:attribute name="while" type="xs:normalizedString"/>
    <xs:attribute name="id" type="xs:ID"/>
  </xs:attributeGroup>

  <xs:complexType name="action.type">
    <xs:attributeGroup ref="action.attlist"/>
  </xs:complexType>

  <xs:element name="action" type="action.type"/>

  <xs:attributeGroup name="script.attlist">
    <xs:attribute name="encoding" type="xh11d:Charset"/>
    <xs:attribute name="implements" type="xh11d:URIorSafeCURIEs"/>
    <xs:attribute name="src" type="xs:anyURI"/>
    <xs:attribute name="type" type="xh11d:ContentTypes"/>
    <xs:attribute name="id" type="xs:ID"/>
  </xs:attributeGroup>

  <xs:complexType name="script.type">
```

```
  <xs:attributeGroup ref="script.attlist"/>
</xs:complexType>

<xs:element name="script" type="script.type"/>

<xs:attributeGroup name="dispatchEvent.attlist">
  <xs:attribute name="raise" type="xs:QName"/>
  <xs:attribute name="to" type="xs:IDREF"/>
  <xs:attribute name="bubbles">
      <xs:simpleType>
          <xs:restriction base="xs:NMTOKEN">
              <xs:enumeration value="bubbles"/>
          </xs:restriction>
      </xs:simpleType>
  </xs:attribute>
  <xs:attribute name="cancelable">
      <xs:simpleType>
          <xs:restriction base="xs:NMTOKEN">
              <xs:enumeration value="cancelable"/>
          </xs:restriction>
      </xs:simpleType>
  </xs:attribute>
  <xs:attribute name="id" type="xs:ID"/>
</xs:attributeGroup>

<xs:complexType name="dispatchEvent.type">
  <xs:attributeGroup ref="dispatchEvent.attlist"/>
</xs:complexType>

<xs:element name="dispatchEvent" type="dispatchEvent.type"/>

<xs:attributeGroup name="addEventListener.attlist">
  <xs:attribute name="event" use="required" type="xs:QName"/>
  <xs:attribute name="handler" use="required" type="xs:IDREF"/>
  <xs:attribute name="phase" default="default">
      <xs:simpleType>
          <xs:restriction base="xs:NMTOKEN">
              <xs:enumeration value="bubble"/>
              <xs:enumeration value="capture"/>
              <xs:enumeration value="default"/>
              <xs:enumeration value="target"/>
          </xs:restriction>
      </xs:simpleType>
  </xs:attribute>
  <xs:attribute name="id" type="xs:ID"/>
</xs:attributeGroup>

<xs:complexType name="addEventListener.type">
  <xs:attributeGroup ref="addEventListener.attlist"/>
</xs:complexType>

<xs:element name="addEventListener" type="addEventListener.type"/>

<xs:attributeGroup name="removeEventListener.attlist">
  <xs:attribute name="event" use="required" type="xs:QName"/>
  <xs:attribute name="handler" use="required" type="xs:IDREF"/>
  <xs:attribute name="phase" default="default">
```

```
          <xs:simpleType>
              <xs:restriction base="xs:NMTOKEN">
                  <xs:enumeration value="bubble"/>
                  <xs:enumeration value="capture"/>
                  <xs:enumeration value="default"/>
                  <xs:enumeration value="target"/>
              </xs:restriction>
          </xs:simpleType>
      </xs:attribute>
      <xs:attribute name="id" type="xs:ID"/>
    </xs:attributeGroup>
    <xs:complexType name="removeEventListener.type">
      <xs:attributeGroup ref="removeEventListener.attlist"/>
    </xs:complexType>

    <xs:element name="removeEventListener" type="removeEventListener.type"/>

    <xs:attributeGroup name="stopPropagation.attlist">
      <xs:attribute name="event" use="required" type="xs:QName"/>
      <xs:attribute name="id" type="xs:ID"/>
    </xs:attributeGroup>

    <xs:complexType name="stopPropagation.type">
      <xs:attributeGroup ref="stopPropagation.attlist"/>
    </xs:complexType>

    <xs:element name="stopPropagation" type="stopPropagation.type"/>

    <xs:attributeGroup name="preventDefault.attlist">
      <xs:attribute name="event" use="required" type="xs:QName"/>
      <xs:attribute name="id" type="xs:ID"/>
    </xs:attributeGroup>

    <xs:complexType name="preventDefault.type">
      <xs:attributeGroup ref="preventDefault.attlist"/>
    </xs:complexType>

    <xs:element name="preventDefault" type="stopPropagation.type"/>
  </xs:schema>
```

C.References

This appendix is *normative*.

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