WSIA - WSRP Core Specification

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Editors:

Alan Kropp, Epicentric, Inc. <akropp@epicentric.com>
Carsten Leue, IBM Corporation <cleue@de.ibm.com>
Rich Thompson, IBM Corporation <richt2@us.ibm.com>

Contributors:

Chris Braun, Novell <cbraun@silverstream.com>
Jeff Broberg, Novell <jbroberg@silverstream.com>
Mark Cassidy, Netegrity <mcassidy@Netegrity.com>
Michael Freedman, Oracle Corporation <Michael.Freedman@oracle.com>
Timothy N. Jones, CrossWeave <tim@crossweave.com>
Thomas Schaeck, IBM Corporation <schaeck@de.ibm.com>
Gil Tayar, WebCollage <Gil.Tayar@webcollage.com>

Abstract:

Integration of remote content and application logic into an End-User presentation has been a task requiring significant custom programming effort. Typically, vendors of aggregating applications, such as a portal, had to write special adapters for applications and content providers to accommodate the variety of different interfaces and protocols those providers used. The goal of this specification is to enable an application designer or administrator to pick from a rich choice of compliant remote content and application providers, and integrate them with just a few mouse clicks and no programming effort.

This specification is a joint effort of two OASIS technical committees. Web Services for Interactive Applications (WSIA) and Web Services for Remote Portals (WSRP) aim to simplify the integration effort through a standard set of web service interfaces allowing integrating applications to quickly exploit new services as they become available. The joint authoring of these interfaces by WSRP and WSIA allows maximum reuse of user facing, interactive web services while allowing the consuming applications to access a much richer set of standardized web services.

This joint standard layers on top of the existing web services stack, utilizing existing web services standards and will leverage the emerging web services standards (such as security) as they become available. The interfaces are defined using the Web Services Description Language (WSDL).

Status:

This draft is an early version of the public spec. Various concepts continue to be debated. Points needing clarification as this evolves into the final specification are much appreciated and may be emailed to *Rich Thompson*.

If you are on the wsia@lists.oasis-open.org or wsrp@lists.oasis-open.org list for committee members, send comments there. If you are not on that list, subscribe to the wsia-comment@lists.oasis-open.org or wsrp-comment@lists.oasis-open.org list and send comments there. To subscribe, send an email message to wsia-comment-request@lists.oasis-open.org or wsrp-comment-request@lists.oasis-open.org with the word "subscribe" as the body of the message.

The errata page for this specification is at http://www.oasis-open.org/committees/xxx/yyy.

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Introduction

Both Web Services for Interactive Applications (WSIA) and Web Services for Remote Portals (WSRP) define a web service interface for accessing and interacting with user-facing, interactive presentation oriented web services.

This specification defines the joint WSIA/WSRP interfaces. It is based on the requirements gathered by both committees and on the concrete proposals to both committees.

WSRP/WSIA functionality is motivated by scenarios including:

- Portal servers providing portlets as user-facing web services that can be used by aggregation engines.
- Portal servers consuming user-facing web services provided by portal or non-portal Producers and integrating them into a portal framework.

However this description also applies to non-portal environments, mostly identified by the WSIA use cases[1]. For a detailed overview of Web Services, Portal Environments and the application of WSRP to these environments please refer to the ***[WSRP Whitepaper]*** and additional documents at http://www.oasis-open.org/committees/wsrp/.

The standard accounts for the fact that Producers (web services conforming to this specification) and Consumers (application consuming Producers in a manner conforming to this specification) may be implemented on very different platforms, be it as a Java/***[J2EE]*** based web service, a web service implemented on Microsoft's ***[.Net]*** platform or a portlet published directly by a portal [A100]. Special attention has been taken to ensure this platform independence.

These services are built on standard technologies including ***[WSDL]***, ***[SOAP]*** and will leverage future applicable Web Service standards, such as WS-Security and WS-Policy (see section 3.1) [A102].

1.1 Motivation

Portals render and aggregate information from different sources and provide it in a compact and easily consumable form to an End-User. Typically, this information consists of markup fragments that are surrounded by a decoration containing controls. The whole construct is commonly referred to as a “portlet” and the content as “markup” or “markup fragment”.

Among typical sources of information are web services. Traditional data oriented web services however require aggregating applications to provide specific presentation logic for each of these web services. Furthermore, each aggregating application communicates with each web service via its unique interface. This approach is not well suited to dynamic integration of business applications and content as a plug-and-play solution.

[1] http://www.oasis-open.org/committees/wsia/use_cases/index.shtml

This specification solves this problem by introducing a user-facing web service interface that allows the inclusion and interaction with content from a data-oriented web service. Such a user-facing web service provides both application logic and presentation logic and corresponds to the remote presentation paradigm well known from distributed systems. This specification provides a common protocol and a set of interfaces for all user-facing web services. Thus aggregating applications can easily adopt these services by utilizing generic proxy code.

1.2 Actors

This protocol describes the conversation between Producers (web service providers) and Consumers (web service requestors) on behalf of End-Users (clients of the Consumer). Producers provide user-facing web services that are able to render markup fragments and process user-interaction requests. Consumers use these services to present the generated markup to End-Users and manage the user's interaction with the markup.

1.2.1 Producer

Producers are modeled as containers of the actual content generators (e.g. portlets from the portal scenario). These content generators are called entities by this specification. Functionally, the Producer provides a set of services including:

- *Self description:* Allows Consumers to find out the capabilities of the Producer and about the entities it hosts, including the metadata necessary for a Consumer to properly interact with each entity.
- *Markup:* Used to render and interact with markup fragments.
- *Registration:* Is used to establish a [trust] relationship between a Producer and a Consumer (e.g. for billing or book keeping purposes).
- *Entity management:* Grants access to the life cycle of the hosted entities.
- *Property management:* Enables programmatic access to an entity's persistent state.

In order to allow different levels of sophistication for both the Producer and Consumer, parts of this functionality are optional. Many of these interfaces involve the Producer invoking a particular entity, though the particulars of both how and when these invocations occur are dependent on the Producer's implementation and therefore are not contained within this specification.

A particular entity is identified with an `entityHandle`. The Consumer uses `entityHandles` throughout the communication to address and interact with entities via the Producer. The entities a Producer publishes as available for all Consumers to interact with are called "Producer_Offered_Entities". Producer_Offered_Entities are pre-configured and not modifiable by Consumers.

If the Producer chooses to expose the *entity management* interface, it is allowing Consumers to clone and customize the entities offered by the Producer. Such a uniquely configured entity is called a "Consumer_Configured_Entity". Like Producer_Offered_Entities, an `entityHandle` is used to address Consumer_Configured_Entities. This `entityHandle` is returned by an invocation of **cloneEntity()** (either directly or indirectly) and is both; 1) invariant until released, and 2) scoped by the registration passed to the invocation of **cloneEntity()**.

Besides entity management, the Producer optionally manages Consumer *registrations*. The Producer may require Consumers to register prior to discovering and interacting with entities. A registration represents a relationship (often including both technical and business aspects) between the Consumer and Producer.

1.2.2 Consumer

A Consumer is an intermediary system that communicates with user-facing web services (i.e. Producers and the entities they host) on behalf of its End-Users. It gathers and aggregates the markup delivered by the entities and presents the aggregation to the End-User. One typical Consumer is a portal, which mediates the markup and the interaction with this markup between End-Users and user-facing web services. Another typical Consumer is an e-Commerce application that aggregates manufacturer provided content into its own pages.

1.2.3 End-User

The main purpose of a Consumer aggregating content from various Producers/entities is the preparation and presentation of markup to an End-User. In addition, the Consumer needs to manage the processing of interactions with that markup in order to properly correlate the interactions with the stateful environment that produced the markup. The protocol of this specification defines two operations, **getMarkup()** and **processInteraction()**, for this purpose:

- **getMarkup()** is invoked to obtain the markup fragments from an entity. The markup returned depends on things such as the entity's current state, the user context, the markup type requested and so on.
- **performInteraction()** is invoked when an End-User interacts with the markup from the entity. This interaction may result in a state change of the entity, which often causes changes in the markup returned on a subsequent **getMarkup()** call.

1.3 Typical Process Flow

While many of the following steps are optional, the typical flow of interactions between these actors is:

1. Establishment of a relationship between the Consumer and Producer. This may involve various things of both a business and technical nature.
2. Establishment of a relationship between the Consumer and End-User. This permits the Consumer to authenticate the End-User and may allow he End-User to personalize the aggregated pages presented by the Consumer.
3. Production of aggregated pages. This typically involves the Consumer defining some base level of page design (often with customized entities) and may involve further customization of those pages by the End-User.
4. Request for a page. This is typically the result of the End-User directly an agent (e.g. browser) to the Consumer's URL, but also occurs indirectly as a result of processing an interaction with the markup of a previous page.
5. Processing interactions. Some End-User interactions with the markup of a page will result in an invocation on the Consumer to provide some logical function. The Consumer will process this invocation to determine the Producer/entity that the interaction has targeted and the nature of the invocation on that entity that has been requested. Since the resulting invocation of that entity is likely to change its state (and may also change the state of other entities), the Consumer must also treat this as an indirect request for a page and thereby loop back to step 4.

6. Destruction of relationships. Much as new relationships are formed, at times relationships end. The impact of this on the protocol is providing for means by which the Producer and Consumer may inform each other that the relationship (or some portion of it) has ended and that related resources may be cleaned up.

1.4 Example Scenarios

This specification supports Consumers and Producers of various levels of sophistication interacting with one another. While not exhaustive, the following cases and how they can interact with each other are explored as examples of the broad range of possibilities.

1.4.1 SimpleProducer

Does not support registration or persistence. May only offer 1 type of entity.

Examples:

- A flight schedule display that is publicly available. Neither user registration nor persistent state is required. The service may however maintain interaction state using a session.
- News feed service that allows the user to browse news topics.

1.4.2 SophisticatedProducer

Requires Consumers to register with the returned reference required for all future invocations. Provides metadata relevant for interacting with the service. Supports a number of entities, which publish metadata declaring supported markup types and properties for interacting with the entity.

Examples:

- Portal server that exposes portlets available through a compliant service endpoint. Each portlet may contain End-User specific settings and information that are persisted on the portal server.

1.4.3 SimpleConsumer

Does not persist any registration/entity information across cycling of the Consumer. Have explicit declarations for binding to and interacting with a set of Producer services.

1.4.4 SophisticatedConsumer

Supports persisting Producer, Consumer and End-User related data. Supports single sign on for its End-Users (may require End-User to trust Consumer with sign-on data). May support discovery of new Producers by either Administrators and/or End-Users.

Examples:

- Typical portal server that access WSIA/WSRP services for content aggregated onto pages.

1.4.5 Interaction between levels of sophistication

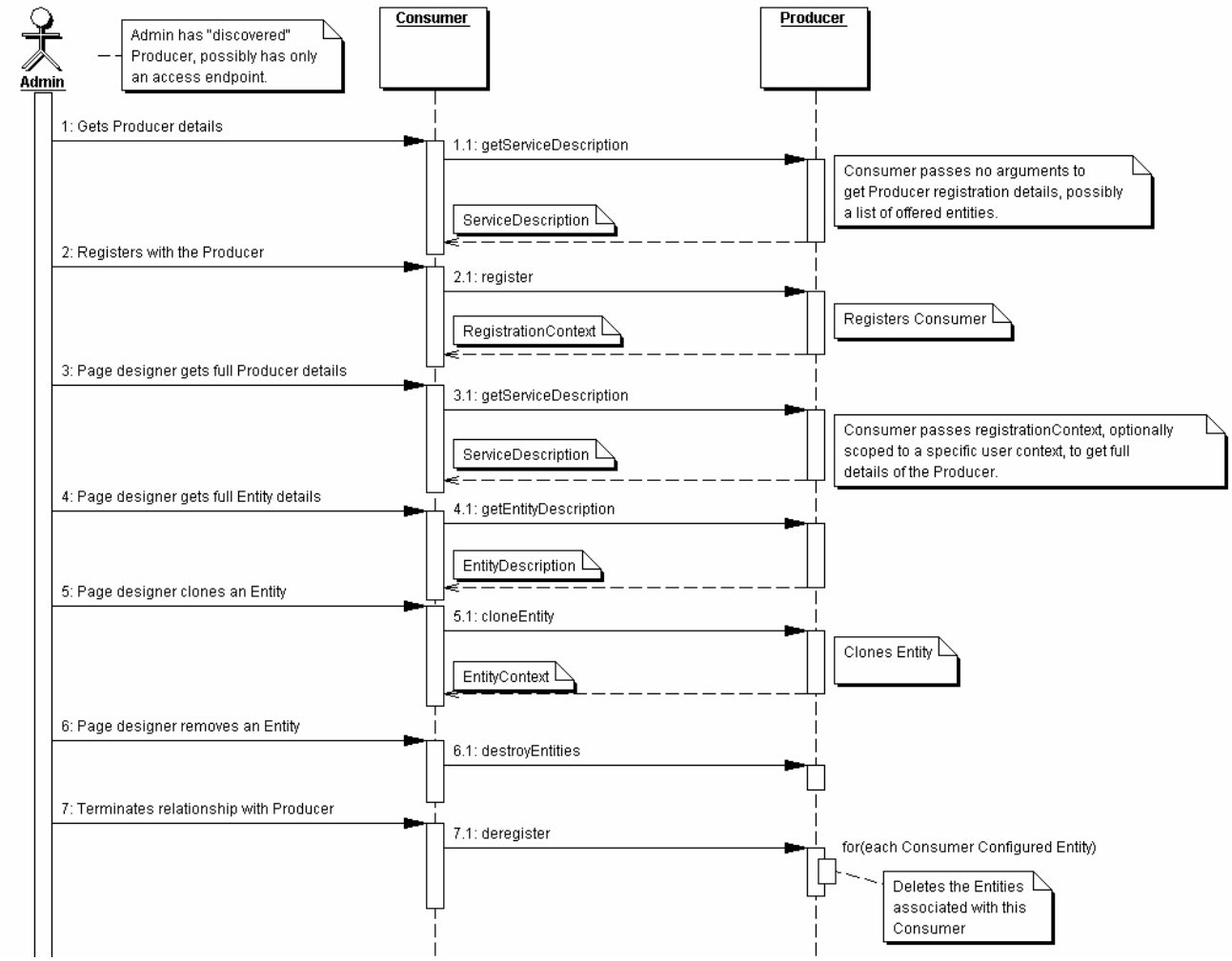
The following illustrate how the interaction between the various parties (End-Users, a Consumer and a Producer) **might** flow for each of the combinations of these example scenarios.

1.4.5.1 Sophisticated Consumer / Sophisticated Producer (stateful +configurable)

These interactions span the entire protocol as this Consumer/Producer pair both support and exploit as much of the protocol as possible.

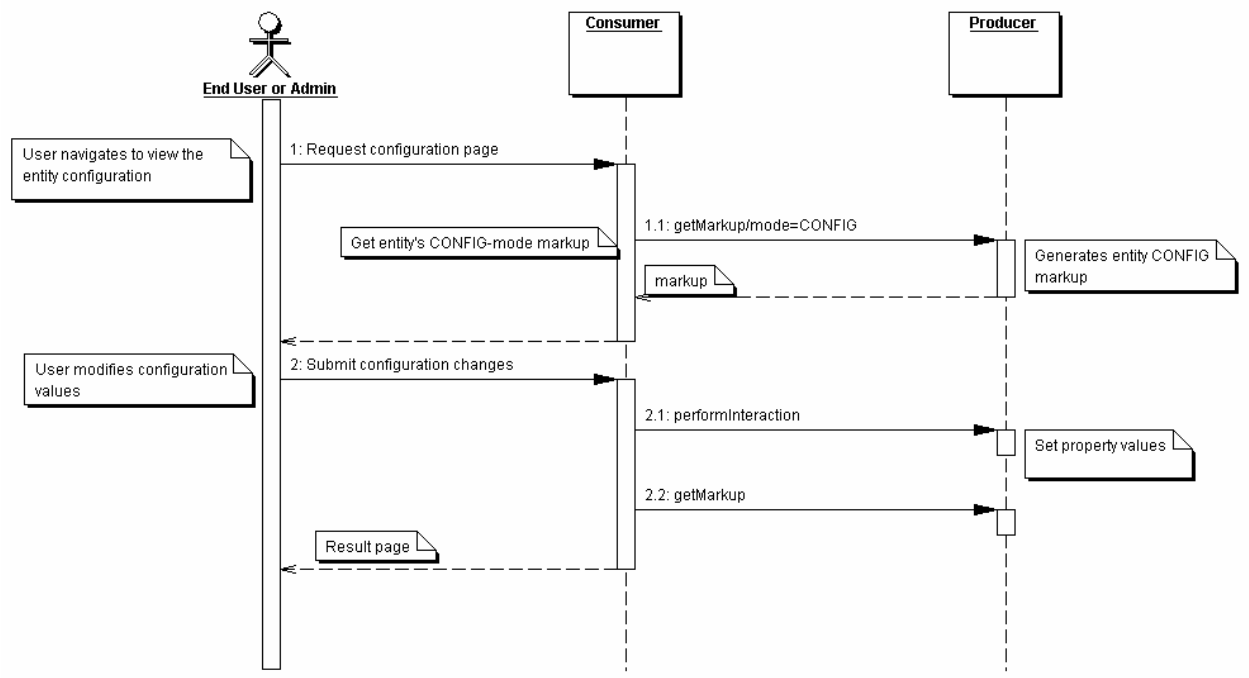
1.4.5.1.1 Administration

Administration involves both the technical and business sides of the relationship between the Consumer and Producer. In particular it involves establishing the relationship, establishing clones of entities the Producer offers that the Consumer may configure and eventually destroying both those configured entities and the relationship itself. The protocol has operations for each of these tasks as depicted below.

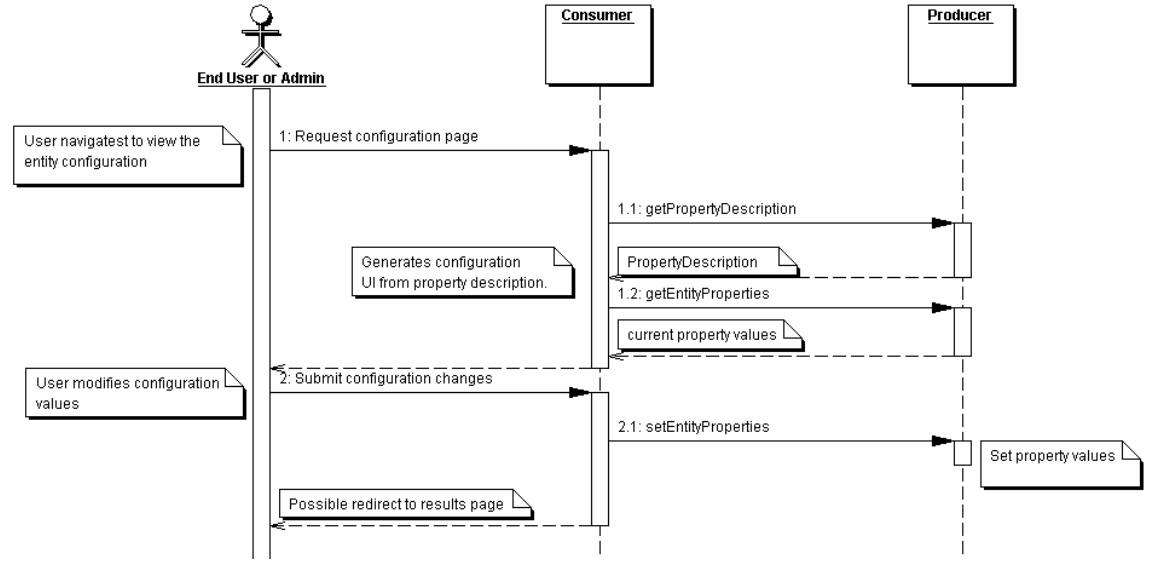


1.4.5.1.2 Configuration

Configuration can occur either using an entity-generated user interface or a consumer-generated interface. First we consider the entity-generated case. This utilizes the same operations as the interactions with an End-User, but with in the CONFIG mode.



The other possibility the protocol enables is consumer-generated interfaces that interact with an entity's properties through their description and current values.



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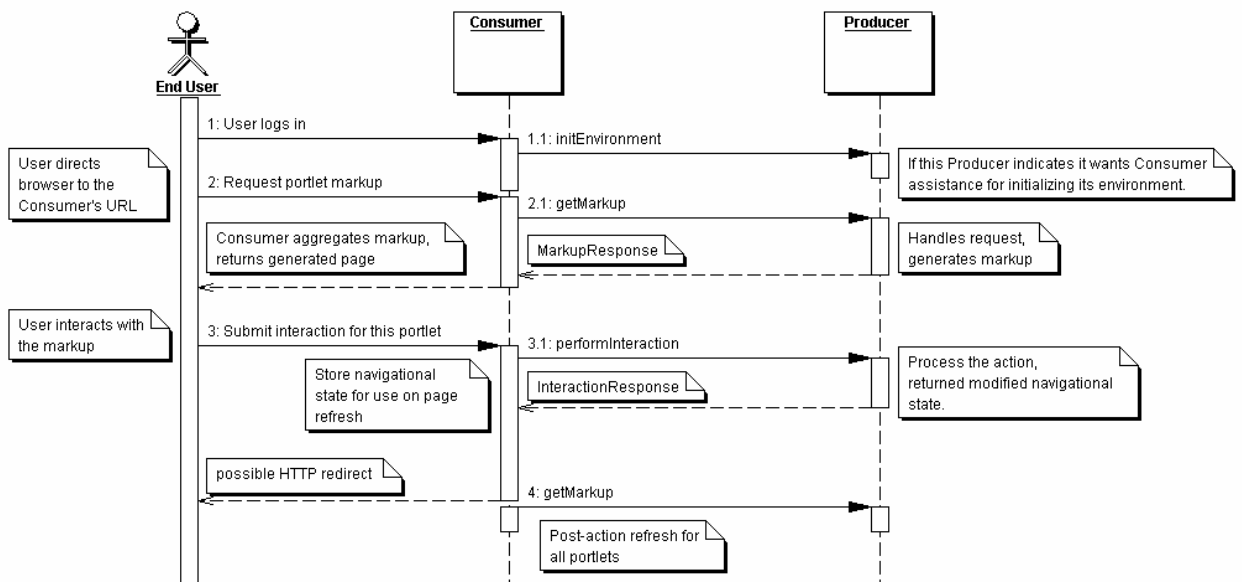
1.4.5.1.3 End-User Interactions

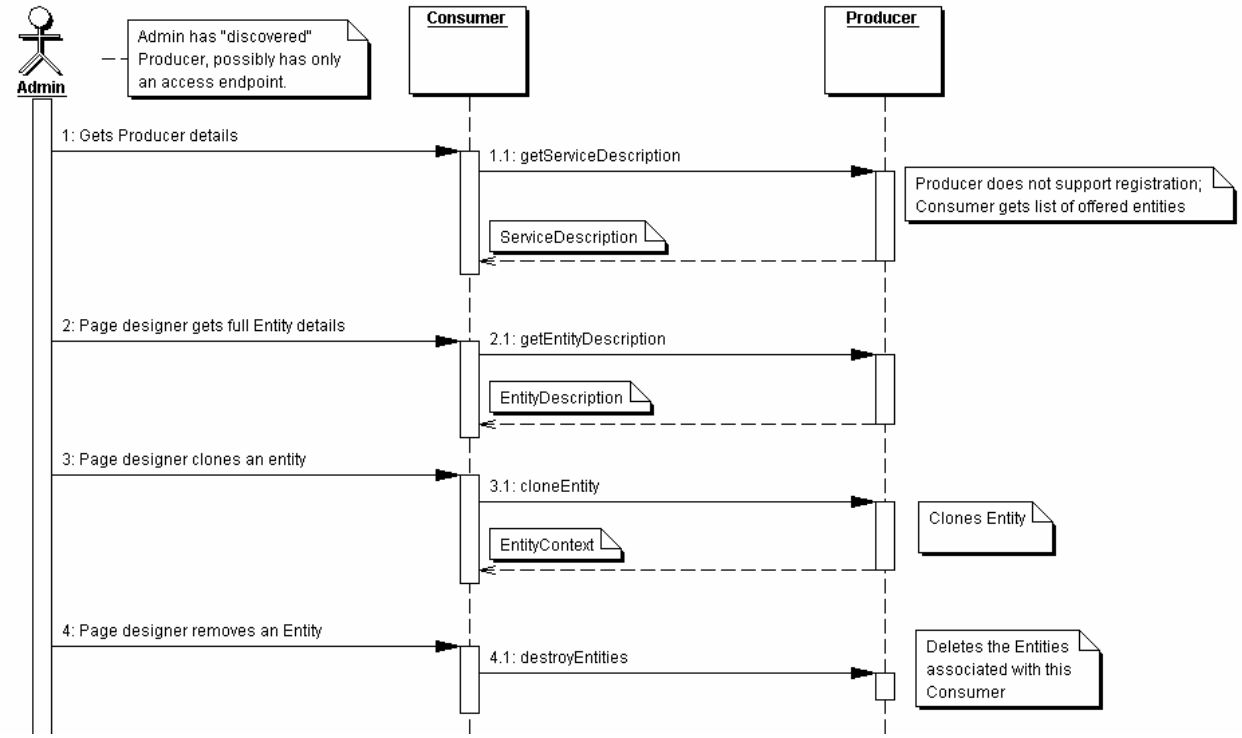
The flow of End-User interactions through the Consumer and Producer using the protocol is depicted below.



1.4.5.2 Sophisticated Consumer / Simple Producer (stateful)

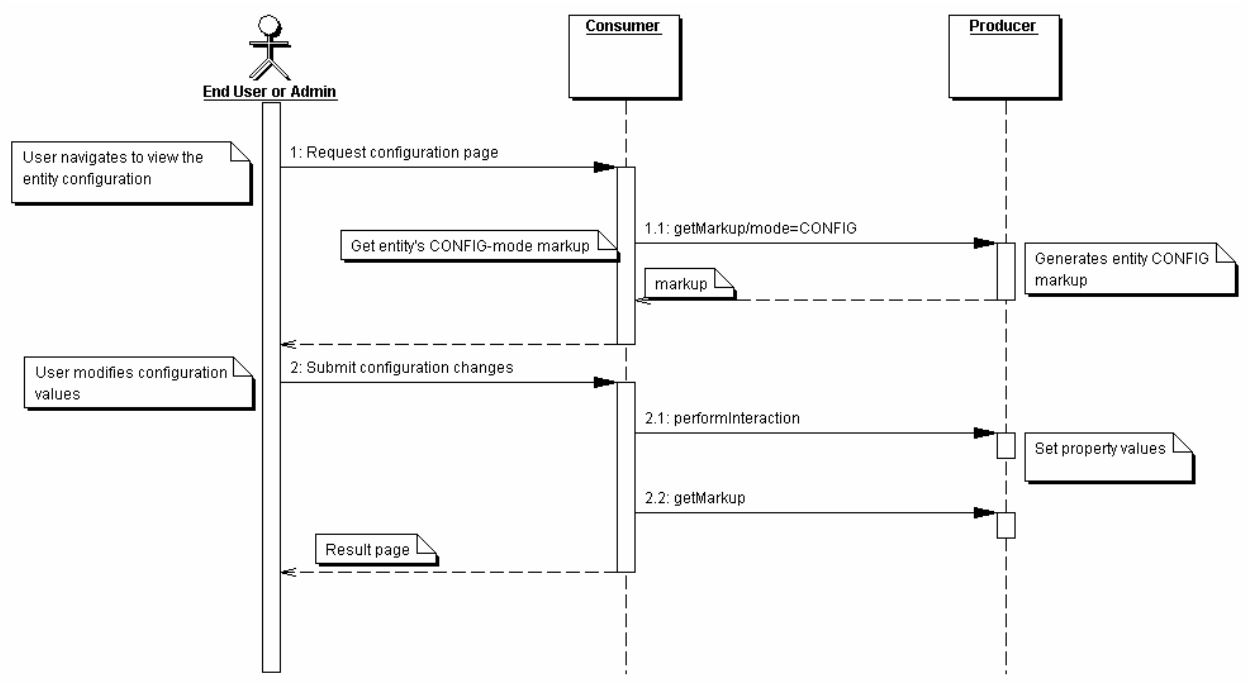
1.4.5.2.1 Administration

Since the Simple Producer example does not offer the registration interface, any aspect of registration that is required occurs outside the protocol. Other portions of the protocol remain unchanged though invocations such as **cloneEntity()** will now return their full state to the Consumer as the Producer does not offer persistence to its entities. Producers choosing this level of functionality should note the security implications of this choice and implement themselves accordingly.

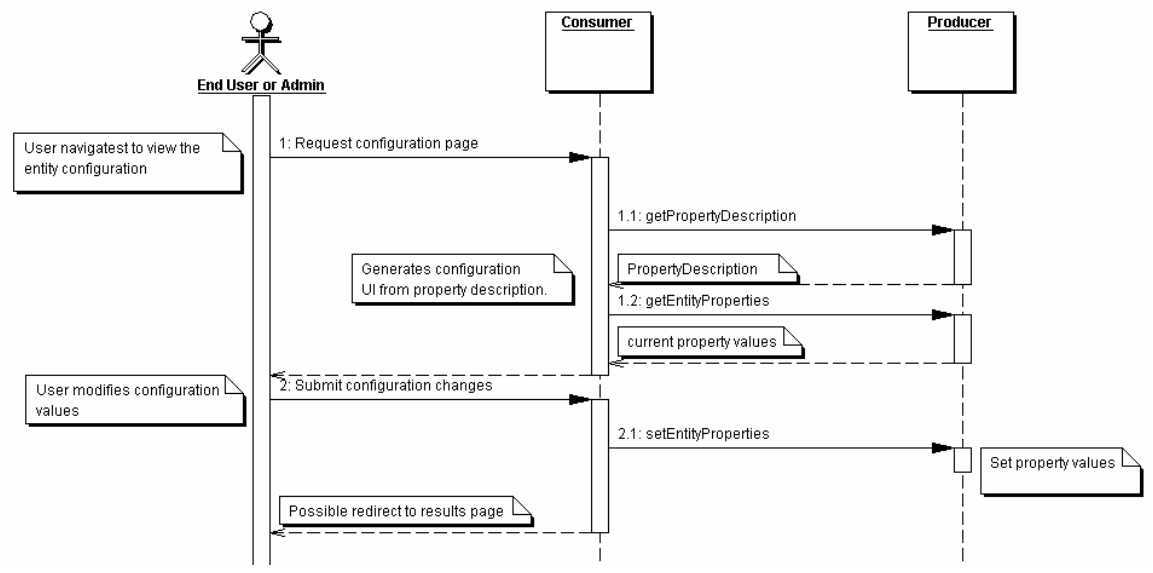


1.4.5.2.2 Configuration

Configuration can occur either using an entity-generated user interface or a consumer-generated interface. First we consider the entity-generated case. This utilizes the same operations as the interactions with an End-User, but with in the CONFIG mode.

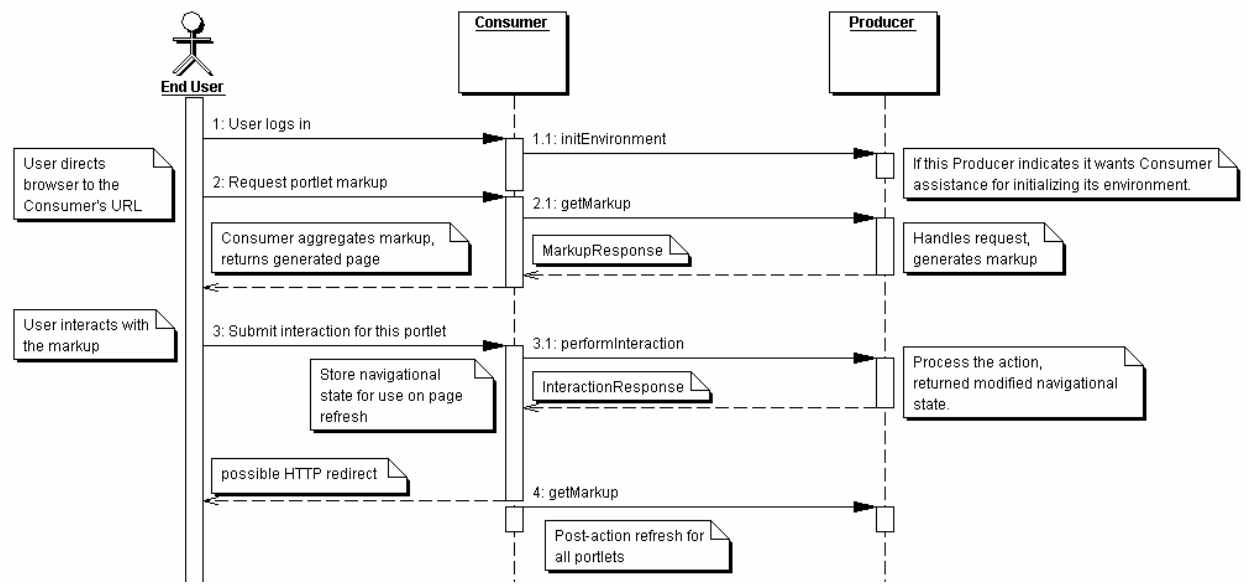


The other possibility the protocol enables is consumer-generated interfaces that interact with an entity's properties through their description and current values.



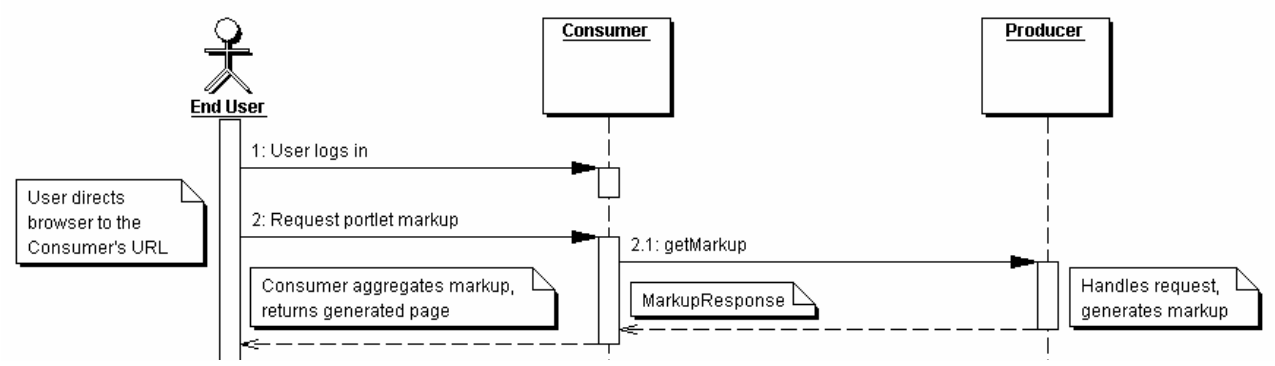
1.4.5.2.3 End-User Interactions

The flow of End-User interaction through the Consumer and Producer using the protocol is depicted below.



1.4.5.3 Simple Consumer / Simple Producer (no state)

The interactions between this pair of actors are limited to the generation of markup based on the state carried by the request for markup itself. This is depicted below:

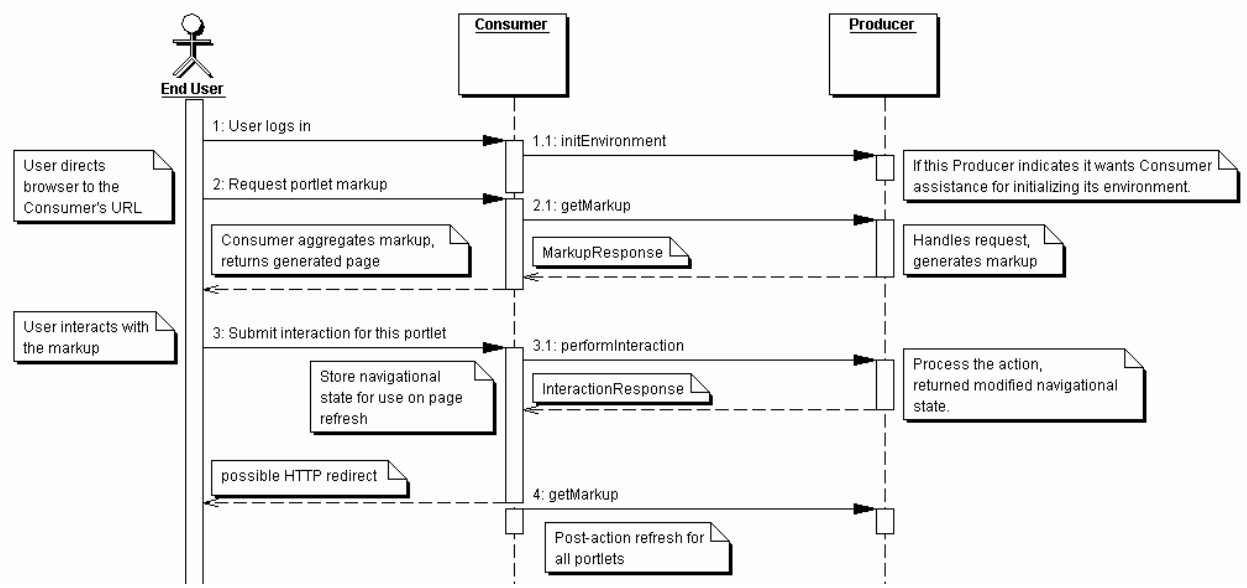


1.4.5.4 Simple Consumer / Simple Producer (with state)

In addition to the previous example, this pair of actors manage the processing of runtime state with the Producer managing that state and the Consumer supplies the means to reference that state when processing End-User interactions.

1.4.5.4.1 End-User Interactions

The flow of End-User interaction through the Consumer and Producer using the protocol is depicted below.

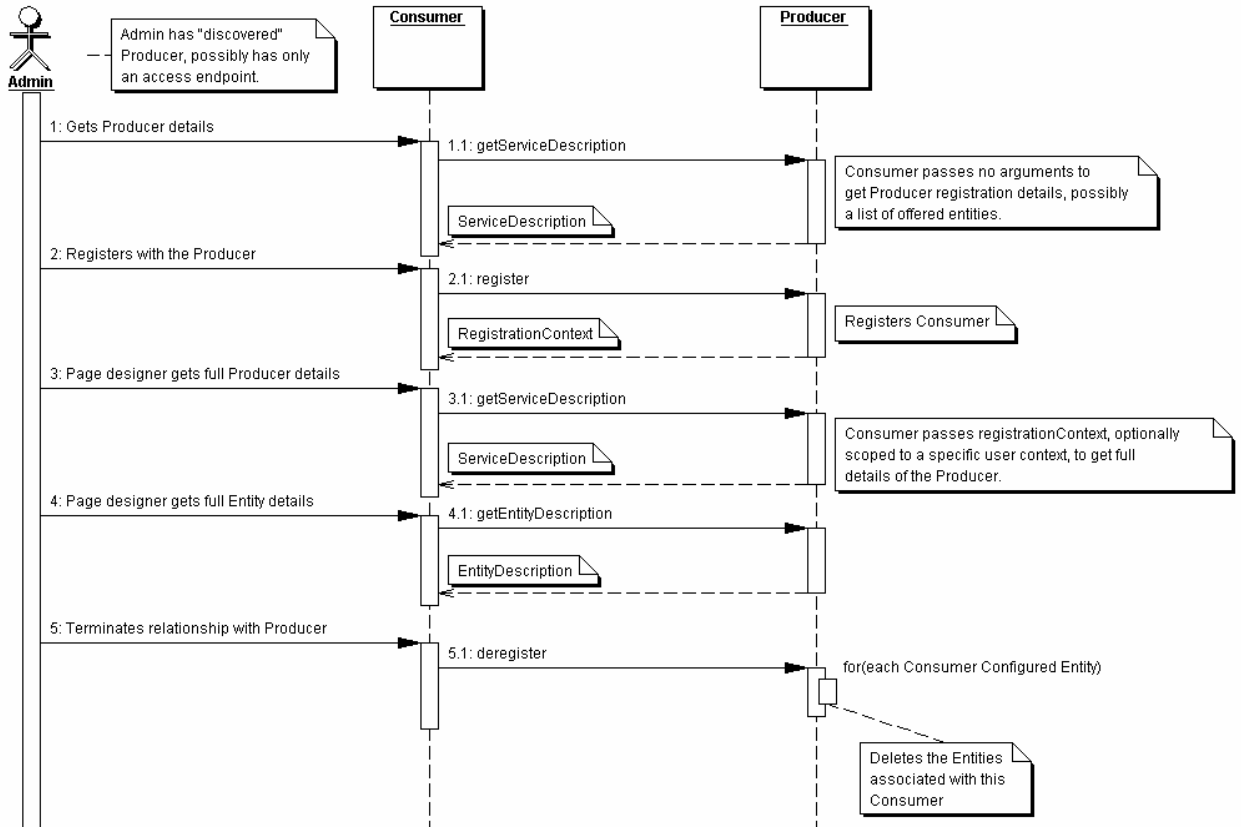

End User
Consumer
Producer
1: User logs in
1.1: initEnvironment
User directs browser to the Consumer's URL
2: Request portlet markup
If this Producer indicates it wants Consumer assistance for initializing its environment.
2.1: getMarkup
Consumer aggregates markup, returns generated page
MarkupResponse
Handles request, generates markup
User interacts with the markup
3: Submit interaction for this portlet
3.1: performInteraction
Store navigational state for use on page refresh
InteractionResponse
Process the action, returned modified navigational state.
possible HTTP redirect
4: getMarkup
Post-action refresh for all portlets

1.4.5.5 Simple Consumer / Sophisticated Producer (stateful +configurable)

While this Consumer example offers minimal services to the Producer, a sophisticated Producer is able to provide a rich set of functionality to the entities it hosts.

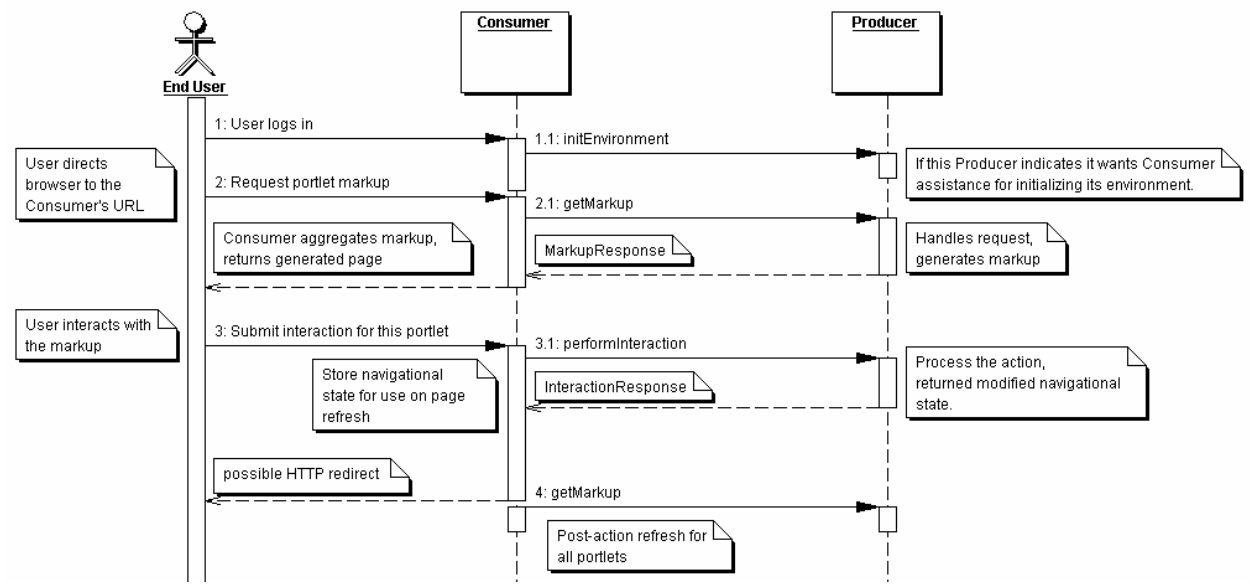
1.4.5.5.1 Administration

Since the Simple Consumer example does not persist registration information, the registration aspect of the relationship with the Producer must be created and destroyed on each set of interactions.



1.4.5.5.2 End-User Interactions

The flow of End-User interaction through the Consumer and Producer using the protocol is depicted below.



2 Terminology

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]**.

Compliance: Mandatory – relevant to legal rules, regulations or laws. Compliancy is the act of complying with a specification and/or standard. Example: ISO 9001. IEEE defines as complying with laws and regulations.

Conformance: Not mandatory – ISO/IEC Guide 2 defines conformance or conformity as fulfillment of a product, process or service of specified requirements. Note that many times providers use “comply” to a standard to sidestep because they don’t actually “conform” to a standard. Reasons they do not “conform” often include the standard is not approved yet or that the provider does not actually meet the standard’s conformance requirements.

Cross references to the ***[Requirements]***http://www.oasis-open.org/committees/wsia/documents/Requirements2002-09-17.html developed by both the WSIA and WSRP technical committees are designated throughout this specification by a hyperlink to the requirement contained where the requirement number is enclosed in square brackets (e.g. [A100]).

3 General Interface Design Issues

The major design goals of this specification are simplicity, extensibility and efficiency.

3.1 Related Standards

This specification seeks to leverage both existing and emerging web service standards whenever possible. The following are particularly noted as relevant standardization efforts.

3.1.1 Existing Standards

WSDL – Defines how abstract interfaces and their concrete realizations are defined.

SOAP – Defines how to invoke remote interfaces.

UDDI – Defines how web services are published, queried and found using standardized directories.

SSL/TLS – Defines secure transport mechanisms.

URL – Defines URI (includes URL) syntax and encoding

Character set encoding

XML Digital Signatures – Defines how portions of an XML document are digitally signed.

SAML – Defines how authentication and authorization information may be exchanged.

P3P – Defines how a Producer/entity may publish its privacy policy so that a Consumer could enforce End-User privacy preferences.

3.1.2 Emerging Standards

XML Encryption – Defines how to encrypt/decrypt portions of an XML document.

WS-Security – Defines how document level security standards apply to SOAP messages.

XACML – Defines a syntax for expressing authorization rules.

RLTC – Defines a syntax for expressing authorization rules.

XCBF – Defines how to exchange biometric data.

WS-Attachments - Defines how to encapsulate a SOAP message and zero or more attachments within a DIME message.

DIME – A lightweight, binary message format that encapsulates one or more resources in a single message construct.

JSR168 – Java Community Process for standardizing a portlet API.

3.2 Data Objects

It is often necessary to pass data to operations. Wherever possible typed data objects are defined as the transport mechanism. Property arrays are included in each data structure for vendor or application specific data extensions. Producers/entities employing these extensions SHOULD provide typing information for the extended data items [A505]. This allows Consumers to provide type checking outside of that done by typical interface layers. This specification introduces various data structures as they are needed for operations and then summarizes them all in Section 11.

3.3 Lifecycles

Lifecycle is a term used to describe how items become available, are interacted with, and finally are destroyed. The two lifecycles included in this specification are:

Persistent: This lifecycle starts with an explicit operation to create the item and ends only with an explicit operation to destroy the item. Examples include the `registrationHandle` and Consumer_Configured_Entities.

Transient: This lifecycle can either start with an explicit operation OR as a side effect of some other operation [A204]. The item created is transient and no explicit operation is required to destroy it. This specification generally includes an `expires` element (a duration in seconds) whenever such an item may be created so that any resources at the Consumer related to the item may be reclaimed at an appropriate time. An example of this is session creation as a refinement on an entityHandle.

3.4 Scopes

Scope is a term used to describe when something is valid. An item often scopes both the usage and lifecycle of other items. The scopes referred to in various places in this specification, namely:

Registration scope: This scope is initiated when a Consumer registers with a Producer and ends when the handle referring to that registration is released. As such it encompasses any entities the Consumer configures and any interactions with the entities of the Producer. From the Producer's perspective, this scope has a persistent lifecycle as the Consumer MUST explicitly invoke **deregister()** to terminate a registration scope. This scope is referenced throughout the protocol using a `registrationHandle`. The Producer optionally exposes this scope by declaring support for the Registration portType. If the Producer exposes the Registration portType, then the Consumer MUST respect the registration requirements established by this specification.

Entity scope: This scope is initiated when an entity is cloned and as such will be encapsulated by a registration scope. This scope ends when the reference to the entity is explicitly released. As such it encompasses all interactions with the entity. This scope has a persistent lifecycle and is referenced using an `entityHandle`. The Producer optionally exposes this scope by declaring support for the EntityManagement portType. If the Producer exposes the EntityMangement portType, then the Consumer MAY clone the Producer_Offered_Entities and uniquely configure them for its own use. The Consumer MAY also choose to directly use the Producer_Offered_Entities.

Session scope: This scope is initiated when the entity needs to store local state and as such will be encapsulated by an entity scope. This scope ends when the session holding that state is released (either via an explicit operation on the Producer OR via a timeout mechanism). As such it encompasses a set of operation invocations in which the Consumer has supplied the refined entity handle (Producer-generated) that also encodes the session. This scope has a transient lifecycle and is established by the Producer returning a new `RefHandlContext`. The Consumer MUST respect this new scope as described in section 5.1.1.

3.5 Types of Stateful Information

Because WSIA and WSRP are connectionless protocols, the Producer must be able to return information to the Consumer, with the understanding that this information will be sent back to it [A200]. Three types of stateful information exist:

Navigational state: This is the state that allows the current page to be correctly generated, including on a page refresh. Web applications typically store this type of state in the URL so that both page refresh and bookmarked pages will generate approximately what the End-User expects. The Producer returns this state to the Consumer as `navigationalState` such that it may satisfy these expectations of the End-User. To supply the bookmarking capability End-Users expect, the Consumer may store this state, or a reference to it, in the URL. The Consumer may also choose to not supply this functionality to its End-Users.

Transient state: This is state stored on the Producer related to a sequence of operations (for example, an e-Commerce site may store a shopping cart in its transient state). Once this type of state is generated, the Producer returns a reference to it and the Consumer must return this reference on future invocations as described in section 5.1.1. This type of state will be referred to as a **Session** (similar to an HTTP Session) and an opaque reference to one is encoded into a refinement on an `entityHandle`.

Persistent state: This is state that the Producer persists until either the Consumer or Producer explicitly discards it. This specification defines two kinds of persistent state with each referred to via a handle that MUST remain invariant once the Producer supplies it to the Consumer. This simplifies a number of issues related to Consumer processing when changes occur relative to a particular persistent state reference. These two kinds of persistent state are:

Consumer Registration: Represents a relationship between a Consumer and Producer. Data that is part of the Consumer registration state impacts all invocations within the scope of the registration. The opaque reference to Consumer registration state is referred to as a **registrationHandle.**

Entity: In addition to the entities a Producer offers for all Consumers to use, the ability of a Consumer to create a unique configuration of one of those entities for its own use is defined. The opaque reference to a configured entity is referred to as an **entityHandle**.

3.6 Persistence and statefulness

This specification makes no assumption about the existence of persistence mechanisms at either the Producer or the Consumer [A201]. In the **getMarkup()** and **performInteraction()** calls, the `navigationalState` field carries the state necessary for the entity to render the current markup to be returned to the Consumer. This enables the Consumer to reasonably support page refresh and bookmarking by the End-User. If the Producer utilizes local state, then it stores the conversational state in an implementation dependent manner, and returns a refined `refHandle` to the Consumer for use during the lifetime of the session.

If the Consumer is operating in a stateless manner, then it may choose the way to achieve this. In the case of HTTP transport the Consumer may employ standard HTTP mechanisms (cookies or URL-rewriting) to push the navigational state or `refHandle` out to its client. If operating in a stateful manner, the Consumer may employ any number of persistence/caching mechanisms [A202].

The nature of the conversation between the client and the Consumer, for purposes of this section, is out of scope [A304]. This does not mean that information about the client, including user profile data, is opaque to the Producer. There are many use cases for which user identity must be conveyed to the Producer [A501][A606]. Also, a stateful Producer MUST relate its private conversational state with the specific client.

3.7 Sessions

In addition to any persistent data, each entity may use a runtime data area (**Session**). An entity MAY establish such a session, and return a refined `refHandle` to reference it within the context of the underlying `entityHandle`, in operations such as **getMarkup(), performInteraction()** and **setEntityProperties()**. The Consumer MUST supply this `refHandle` on subsequent requests to the entity until either the Producer indicates it is invalid or it timeouts [A205]. In general, the session between a Consumer and an entity at the Producer maps to an End-User session of the Consumer.

3.8 Producer Mediated Sharing

Producers may implement a sharing mechanism through techniques such as a shared area within sessions for entities to use. The Producer indicates which entities share such data areas via the `groupID` parameter in the entity metadata. The Consumer MUST respect this grouping as detailed in section 5.4.

Shared data areas introduce implementation challenges in clustered environments. In such an environment, multiple concurrent requests may be routed to different cluster nodes. The Producer must ensure that entities with a common shared data area have access to the shared data even in such situations. Possible implementation choices include:

- The Producer stores the shared data in a database and accesses the same database from all cluster nodes.
- In the case of HTTP transport, a Producer can use HTTP sessions to store the shared data. It must implement a mechanism that ensures only one shared HTTP session is established for each `groupID`, even for concurrent requests.

3.9 Information Passing Mechanisms

All information passing enabled by this specification is between exactly one Producer and one Consumer. Any sharing of information within a particular Producer service is outside the scope of this specification. If the Consumer wants the information to be shared by multiple Producer services, the Consumer must "mediate" this sharing (again, using means that are outside the scope of this version of the specification).

3.10 Event Handling

Event handling is explicitly not part of this version of the specification. It might be included in a future version of WSRP.

3.11 Two-step protocol

This specification attempts to account for both isolated interactions between a Consumer and a Producer, and also those interactions that may cause state changes in other entities the Consumer aggregates from the same Producer [A503]. Common causes of such shared state include use of a common backend system (e.g. database) and Producer mediated data sharing. For these reasons, there is a "two-step" capability built into the protocol.

In this two-step interaction, the Consumer first invokes **performInteraction()** on the entity whose markup the End-User interacted with and MUST block all other invocations within the context of the initiating request from the client of the Consumer until either the receipt of a response or the invocation fails (e.g. times out). The Consumer then invokes **getMarkup()**on the entities being aggregated.

Interaction semantics are well defined across the spectrum of interaction styles supported in the protocol. In other words, the results of the Consumer invoking **performInteraction()** on an entity, regardless of whether the interaction may have side effects on other entities at the Producer, is well-defined independent of the order of **getMarkup()** invocations on the entities.

Side effects that may cross Producer boundaries are out of scope for this version of the specification, though mechanisms to standardize such interactions are intended for future versions.

3.12 Interaction Lifecycle States

This section defines the state transitions for the relationship between a Producer and a Consumer.

3.12.1 Assumptions:

In general the Producer is a web service endpoint exposing one or more entities that generate markup and handle interactions with that markup. How these entities are implemented and managed is not defined by this specification, though it is anticipated that the model of how requests are conveyed to the entities by the Producer will be strongly influenced by this specification.

3.12.2 State 0: Unknown

The Consumer has no knowledge that the Producer exists. From this state the Consumer transitions to the **Known** state via discovery; namely by learning the location of the Producer's WSDL. Examples of mechanisms for discovering this include UDDI query, WSIL declarations or other ad hoc mechanisms [A110].

3.12.3 State 1: Known

In this state the Consumer knows the location (i.e. its access point and at least the WSDL of the self description method) of the Producer. From this state the Consumer can transition back to the **Unknown** state, but typically transitions to the **Active** state. This usually involves discovery of whether of not the Producer requires registration. Additionally, this is the earliest state at which the Consumer MAY request a Producer to describe itself [A104]. This ability is present in all states other than **Unknown**.

3.12.4 State 2: Active

Most of the interesting things happen while the Producer is in the **Active** state. This state is where clients can interact with the Producer. It is possible to transition back to the **Known** state by releasing all resources related to the relationship with the Producer. The Consumer is free to perform this state transition multiple times.

3.13 Transport Issues

Since the transport layer is often used to store various pieces of information (e.g. J2EE load balancing depends on the JSessionID cookie) and these pieces of information often will pertain to the End-User rather than the Consumer, we strongly recommend that Consumers manage transport layer issues, such as cookies, in a manner that correctly returns them to the Producer only for subsequent invocations on behalf of the same End-User and note that failure to properly do this management will eliminate the ability to use Producers that set `requiresCookieSupport` to 'true'.

---

4 Service Description Interface

A Producer may be discovered through mechanisms such as ***[UDDI]*** or ***[WSIL]***, which also provide the capabilities of the service. Other discovery mechanisms (e.g. emailed URL to a properly enabled browser) do not expose these capabilities. The **getServiceDescription()** operation provides a discovery mechanism agnostic means for a Consumer to ascertain a Producer's or entity's capabilities [A110]. This interface is required of all Producers to provide a well-defined means for Consumers to ascertain the requirements to register or use the Producer.

4.1 New Data Structures

The operations in this section introduce the following new data structures:

4.1.1 Extension

The `Extension` structure contains the payload extension mechanism for vendor and application extensions. This allows arbitrary elements from other namespaces to be sent as part of other data structures. We would encourage these to either be of type `xsd:string` or be explicitly typed in a WSDL file that carries the relevant type definitions.

Extension	
[O] Object	any

Members:

- `any`: A schema declaration that implementations MAY choose to extend this structure provided those extensions come from a different namespace.

4.1.2 ServiceDescription

The `ServiceDescription` structure contains a set of fields that describe the offered services of the Producer.

ServiceDescription	
[O] EntityDescription[]	offeredEntities
[O] anyURI	wsdlURL
[O] RoleDescription[]	roleDescriptions
[O] boolean	requiresCookieSupport
[O] boolean	doInitEnvironment
[O] boolean	requiresRegistration
[O] ModelDescription	registrationProperties
[O] Extension[]	extensions

Members:

- `offeredEntities`: An array of structures (defined in Section 11) containing the metadata for the Producer_Offered_Entities.
- `wsdlURL`: The URL for the WSDL abstract description of the Producer.
- `roleDescriptions`: An array of role description structures as defined in Section 11. This array MUST include an entry for any role the Producer is willing to have the Consumer assert for an End-User.
- `requiresCookieSupport`: A boolean (default value = false) indicating whether or not the Producer uses the cookie support of the HTTP protocol. A Consumer interacting with a Producer that has set `requiresCookieSupport` to 'true' MUST properly manage cookies on behalf of its End-Users as a network intermediary.
- `doInitEnvironment`: A boolean (default value = false) indicating whether or not the Producer requires the Consumer invoke **initEnviroment()** for each groupID for each End-User in order to allow the Producer the opportunity to properly initialize itself (usually related to Producer-mediated data sharing). Due to the blocking nature of this invocation, it is recommended that Producers not set this flag unless such invocations are truly required in order to initialize properly.
- `requiresRegistration`: A boolean (default value = true) indicating whether or not the Producer requires Consumer registration. If `requiresRegistration` is set to false then it MUST be valid to pass null for the `registrationContext` parameter to all operations having this parameter.
- `registrationProperties`: Property descriptions for what may and must be supplied during registration.

- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

4.1.3 UserContext

The `UserContext` structure supplies End-User specific data to operations. Note that this does not carry user authentication type information (e.g. userID / password) as quite flexible mechanisms for communicating this information is being defined elsewhere (e.g. WS-Security (see section 3.1.2) defines how to carry User Information in a SOAP header).

```
UserContext
    [R] String        profileKey
    [O] String[]      producerRoles
    [O] UserProfile   profile
    [O] Extension[]   extensions
```

Members:

- `profileKey`: A string that MAY be used as a reference to the user and that MUST remain invariant for the duration of a Consumer's registration. This key may be any token that the Consumer has for uniquely identifying the End-User. Examples include, but are not limited to, the userid (preferably encoded for privacy reasons) the End-User used when authenticating themselves to the Consumer. Establishment of the link between the user profile data and the `profileKey` SHOULD only occur within the context of a secure communication between the Consumer and Producer.
- `producerRoles`: An array of strings, each of which specifies an entity-defined role which the Consumer authorizes for the End-User relative to the current operation.
- `profile`: End-User profile data structure as defined in section 11.23.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

4.1.4 RegistrationState

The `RegistrationState` structure contains fields related to a particular registration of a Consumer with a Producer. It is returned by the **modifyRegistration()** operation and contains the fields of a `RegistrationContext` that allow a Producer to push the storage of state at registration scope to the Consumer.

```
RegistrationState
    [O] String        registrationState
    [O] Extension[]   extensions
```

Members:

- `registrationState`: This field is used only when the Producer wants the Consumer to provide persistent storage for the state resulting from processing the registration. If this field is non-null, the Consumer MUST return this value on any subsequent calls in the context of this registration [R362].
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

4.1.5 RegistrationContext

The `RegistrationContext` structure contains fields related to a particular registration of a Consumer with a Producer. It is returned by the **register()** operation and is a required parameter on most other operations.

```
RegistrationContext
    [R] String      registrationHandle
    [O] String      registrationState
    [O] Extension[] extensions
```

Members:

- `registrationHandle`: An unique, invariant and opaque reference to the Consumer-Producer relationship. This reference is generated by either the **register()** operation [R355] or a process outside the scope of this specification.
- `registrationState`: This field is used only when the Producer wants the Consumer to provide persistent storage for the state resulting from processing the registration. If this field is non-null, the Consumer MUST return this value on any subsequent calls in the context of this registration [R362].
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

4.2 getServiceDescription() Operation

This operation allows a Producer to provide information about its capabilities in a context-sensitive manner (e.g. registration may be required to discover the full capabilities of a Producer) [R303].

```
serviceDescription = getServiceDescription(registrationContext, userContext);
```

Producers may choose to restrict the information returned in `serviceDescription` based on the supplied registration and user contexts. The minimum information a Producer MUST return is that which declares what is required for a Consumer to register (e.g. the `registrationProperties` field) with the Producer [R300][R301][R303]. Producers may also find it useful to restrict the information returned to those portions of the service the registration and user contexts allow the End-User to access on subsequent invocations. For example, using the supplied `userContext` to filter and return only those entities that the user has access to. Note that both parameters to this operation are likely to be null when an unregistered Consumer invokes it. This allows the Consumer to gain access to the information required to successfully register. It is recommended that Consumers invoke **getServiceDescription()** after registering in order to receive the full capabilities the Producer is offering within the context of that registration. Producers MUST return a complete enough description to registered Consumers for them to properly interact with both the Producer and entities it exposes.

5 Markup Interface

As user facing web services, one of the required portTypes a WSIA or WSRP compliant service MUST implement is the generation of markup, which is to be used to represent the current state of an entity to an End-User and the processing of interactions with that markup [A300]. This section explains both the signatures for the operations related to markup generation and processing interactions, and how the concepts of mode and window state impact the generation of the markup.

5.1 New Data Structures

The operations in this section introduce the following new data structures:

5.1.1 refHandle

The `refHandle` parameter provides the finest scoped handle the Consumer has for accessing the entity. When first interacting with an entity for a particular End-User/Consumer session, the Consumer initializes this parameter with the `entityHandle` for the entity targeted by the invocation. If the Producer returns a `newRefHandle` in a `RefHandleContext` from any invocation for this use of the entity for the End-User, the Consumer MUST use the new `refHandle` on subsequent invocations until the Consumer determines the `refHandle` has timed out (i.e. based on either a fault message from the Producer or the expires information supplied with the `refHandle`) [A206].

```
String   refHandle
```

A common reason for a Producer to return a new `refHandle` is the initialization of a session (e.g. data store for local state). Since the session will have a transient lifetime, the Producer SHOULD encode the base `entityHandle` in the new `refHandle` so that it may cleanly deal with re-establishing a timed out session without requiring additional invocations from the Consumer.

5.1.2 EntityContext

The `EntityContext` structure is used as a parameter on many operations to supply the entity information that was pushed to the Consumer.

```
EntityContext
    [O] String       entityState
    [O] Extension[]  extensions
```

Members:

- `entityState`: An opaque string the entity uses when it depends on the Consumer to store its persistent state [A205]. If `entityState` has a non-null value, the Consumer MUST return this value on subsequent calls using the same `entityHandle`. Note that such uses MAY span various cycling of the Consumer and therefore this state MUST be persisted by the Consumer until successfully invoking **destroyEntities()** with the related `entityHandle`.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

5.1.3 CacheControl

The `CacheControl` structure contains a set of fields needed for the entity to manage cached markup fragments.

```
CacheControl
    [R] int          markupExpires
    [O] String[]     cacheHints
    [O] Extension[]  extensions
```

Members:

- `markupExpires`: Number of seconds the markup fragment referenced by this cache control entry remains valid. A value of –1 indicates that the markup fragment will never expire.
- `cacheHints`: Array of CacheHint constants that define what information of the input space for **getMarkup()** the generated fragment depends on. The Consumer can use this information to determine, prior to a call to **getMarkup()**, if it may get content from the fragment cache or needs to retrieve an updated fragment based on updated input data. The following constants are defined:
    a. `CACHE_USER`: Parts of the `userContext` have been used to generate the markup. The Consumer needs to retrieve new content if the `userContext` structure changes between requests.
    b. `CACHE_REGISTRATION`: Parts of the `registrationContext` have been used to generate the markup. The Consumer needs to retrieve new content if the `registrationContext` structure changes between requests.
    c. `CACHE_MARKUP_PARAMS`: Parts of the `markupParams` have been used to generate the markup. The Consumer needs to retrieve new content if the `markupParams` structure changes between requests. This flag only needs to be set if parts of the markup parameters other than the ones listed in Section 5.2.1.2 have been changed.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

5.1.4 MarkupParams

The `MarkupParams` structure contains a set of fields needed for the entity to generate markup that will enable the End-User to visualize the state of the entity.

```
MarkupParams
    [R] Clientdata   clientData
    [R] boolean      secureClientCommuncations
    [R] String       locale
    [R] String       markupCharacterSet
    [R] String       markupType
    [O] String       mode
    [O] String       windowState
    [O] String       navigationalState
    [O] Property[]   requestParameters
    [O] Property[]   requestMetadata
    [O] Extension[]  extensions
```

Members:

- `clientData`: A structure (defined in section 11.2) that provides information (including `userAgent` and `deviceInfo`) about the client device which will render the markup.
- `secureClientCommunications`: A flag indicating whether or not the communications between a client and Consumer is secure [R401]. The Consumer MUST set the `secureClientCommunications` flag as the entity MAY render different content when it knows the delivery channel is secure.
- `locale`: Locale[2] for which to generate the markup (e.g. “en-US”). The Consumer SHOULD supply this information based on the setting the End-User has requested.

[2] http://lcweb.loc.gov/standards/iso639-2/langcodes.html

- `markupCharacterSet`: The `characterSet` the Consumer would like the entity to use for encoding the markup (i.e. the character set for the aggregated page). This encoding may be different from the character set used for the transport of the invocation from the Consumer to Producer. The Producer MUST either use this character set for the response message or properly escape any characters that would otherwise not be properly represented in the character set of the response message.
- `markupType`: The Mime Type[3] of markup to generate (e.g. 'text/html', 'application/xhtml+xml', etc.).
- `mode`: The mode for which the entity should render its output. A set of modes is defined in this specification (see section 5.6). The Consumer SHOULD inspect the entity's metadata to determine which of these modes the entity supports in addition to any Producer defined modes. The Consumer MUST specify either one of the modes from the entity's metadata or `VIEW_NORMAL` (all entities are required to support this mode).
- `windowState`: The state of this entity's virtual window relative to other entities on the aggregated page (e.g. *normal, minimized, maximized, detached).* Constants for these specification-defined states are found in section 5.7.
- `navigationalState`: This field contains the opaque navigational state for this entity either from the appropriate URL parameter (see section 9.2.1.1) or the most recently returned value for this End-User.
- `requestParameters`: Name/value pairs reflected either from the query string of the activated URL. These are all the query string parameters the Consumer did not consumer by processing them itself.
- `requestMetadata`: Name/value pairs reflected either from transport level (e.g. HTTP) headers of the initial client request or additional parameters the Consumer supplies from data stores that it manages.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

5.1.5 MarkupResponse

The `MarkupResponse` structure contains fields for returning various items in response to a **getMarkup()** invocation.

MarkupResponse	
[O] RefHandleContext	refHandleContext
[O] String	markup
[O] CacheControl	cacheControl
[O] String	preferredTitle
[O] boolean	needsUrlRewriting
[O] Extension[]	extensions

Members:

- `response`: This structure contains fields that are returned from various operations, including a new `refHandle` and the duration before it expires.

[3] http://www.isi.edu/in-notes/iana/assignments/media-types/media-types

- `markup`: The markup to be used for visualizing the current state of the entity. This is a string in order to support non-XML markup (e.g. HTML). If this is encoded in a SOAP message (i.e. XML), various characters will likely need to be escaped, either by the entity or the Producer's runtime (e.g. '<' and '>'). The character set of the markup an entity returns MUST either match that requested in `MarkupParams` or be UTF-8. When a SOAP binding is used, the character set of the markup returned by the Producer MUST match the character set of the SOAP envelope.
- `cacheControl`: Defines the caching policies for the returned markup fragment.
- `preferredTitle`: The title the entity would prefer to be used in any decoration of the markup.
- `needsUrlRewriting`: A flag by which the entity/Producer indicates whether or not Consumer-side URL rewriting (see section 9.2.1) is needed. The Consumer MUST parse the markup for URL rewriting if this flag is set to 'true'.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

5.1.6 Templates

The `Templates` structure contains a set of fields that enable Producer URL writing. The template style format of these fields is defined in section 9.2.2.

Templates		
[O]	String	DefaultTemplate
[O]	String	ActionTemplate
[O]	String	RenderTemplate
[O]	String	ResourceTemplate
[O]	String	SecureDefaultTemplate
[O]	String	SecureActionTemplate
[O]	String	SecureRenderTemplate
[O]	String	SecureResourceTemplate
[O]	String	NameSpacePrefix
[O]	Extension[]	extensions

Members:

- `DefaultTemplate`: This template provides the default value for all of the other template fields. Note that the `SecureDefaultTemplate` field MAY provide a first-level override of this default value for the fields whose names begin with "Secure", as these frequently involve a different protocol specification.
- `ActionTemplate`: This template provides the template for URLs that will be directed to the Consumer and processed as a **performInteraction()** on the entity.
- `RenderTemplate`: This template provides the template for URLs that will be directed to the Consumer and processed as a **getMarkup()** on the entity.
- `ResourceTemplate`: This template provides the template for URLs that will be directed to the Consumer and processed as an HTTP GET on the named resource.
- `SecureDefaultTemplate`: This template provides the default value for all the secure template fields.
- `SecureActionTemplate`: This template provides the template for secure URLs that will be directed to the Consumer and processed as a **performInteraction()** on the entity using a secure protocol.
- `SecureRenderTemplate`: This template provides the template for secure URLs that will be directed to the Consumer and processed as a **getMarkup()** on the entity using a secure protocol.

- `SecureResourceTemplate`: This template provides the template for secure URLs that will be directed to the Consumer and processed as an HTTP GET over SSL/TLS on the named resource.
- `NameSpacePrefix`: This field provides a string the entity MAY use to prefix tokens that need to be unique on the aggregated page (e.g. JavaScript variables, html id attributes, etc.).
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

5.1.7 InteractionResponse

The `InteractionResponse` structure contains the various items **performInteraction()** can return.

InteractionResponse	
[O] RefHandleContext	refHandleContext
[O] EntityResponse	entityResponse
[O] String	navigationalState
[O] String	newWindowState
[O] String	newMode
[O] String	redirectURL
[O] Extension[]	extensions

Members:

- `refHandleContext`: This structure contains fields that are returned from various operations, including a new `refHandle` and the duration before it expires.
- `entityResponse`: This structure is where an entity using Consumer side persistent storage may return a change in its persistent state, provided the `entityStateChange` flag in `InteractionParams` had been set to 'OK' or 'Clone'. When the `entityStateChange` flag had been set to 'Clone', this may also include a new `entityHandle`. The sequence by which an entity can otherwise request changing this state is described in section 5.3.1.
- `navigationalState`: Opaque representation of navigational state which the entity is returning to the Consumer to indicate a change from what was supplied on the invocation. This field allows the Consumer to properly support End-User page refreshes and page bookmarks. The Consumer MUST supply this value as the `navigationalState` on subsequent invocations for this use of the entity until the entity supplies a replacement value. This ensures the correct state of the entity is used when processing the invocation. If this field is not returned to the Consumer, the Consumer MUST supply the same `navigationalState` to the next invocation (often **getMarkup()**) as was supplied to **performInteraction()**.
- `newWindowState`: A request from the entity to change the window state. The Consumer MAY choose to respect this request, but since the entity cannot depend on that choice it MUST NOT encode this new window state into any of its stateful settings. Rather, the entity MUST compute any such impact on stateful settings after the Consumer has actually changed the window state.
- `newMode`: A request from the entity to change the mode. The Consumer MAY choose to respect this request, but since the entity cannot depend on that choice it MUST NOT encode this new mode into any of its stateful settings. Rather, the entity MUST compute any such impact on stateful settings after the Consumer has actually changed the mode.

- `redirectURL`: As a result of processing this interaction, the entity is indicating to the Consumer that it would like the user to view a different URL. The Consumer MAY choose whether this request is a replacement for the aggregated page the Consumer is presenting to the End-User or whether some other means of satisfying the entity's request is appropriate (e.g. spawning a new browser window, etc).
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

5.1.8 InteractionParams

The `InteractionParams` structure contains fields specific to invoking the **performInteraction()** operation.

InteractionParams	
[O] StateChange	entityStateChange
[O] base64Binary	uploadData
[O] String	uploadDataMimeType
[O] Extension[]	extensions

Members:

- `entityStateChange`: A flag (default value='OK') by which a Consumer indicates whether or not the processing of the interaction is allowed to return a modified `entityState`. This flag is needed as only the Consumer knows whether or not such a state change would be acceptable. In many cases where the Consumer does not authorize the End-User to modify the persistent state of the entity in use, it may permit the Producer to clone the entity (i.e. set `entityStateChange` to 'Clone') and return a clone of the entity in addition to any other return parameters. The full use of this flag is described in section 5.3.1.
- `uploadData`: A binary data blob that is used if a file is being uploaded.
- `uploadDataMimeType`: Mime type of what is in the `uploadData` field. The `uploadDataMimeType` MUST be supplied when the `uploadData` field is not empty.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

5.1.9 groupID

The `groupID` parameter provides means for the Consumer to inform the Producer about which Producer-specified group an **initEnvironment()** invocation is for. The value of this parameter MUST be one the Producer specified in the metadata for the entities it hosts.

String	groupID

5.2 getMarkup() Operation

The Consumer requests the markup for rendering the current state of an entity by invoking:

```
markupResponse = getMarkup(refHandle, _groupID_1registrationContext,
entityContext,
                           userContext, markupParams, templates);
```

As described in section 5.1.1, the Consumer MUST initialize `refHandle` to the value of the `entityHandle` for the targeted entity. Once the Producer has returned a refined `refHandle` (via the `newRefHandle` field of a `RefHandleContext` structure), the Consumer MUST supply the new `refHandle` on subsequent invocations until either the Producer provides yet another replacement or the `refHandle` times out (based on the `refHandleExpires` field in the `RefHandleContext` that supplied the new `refHandle`). All `refHandles` returned in a `RefHandleContext` structure are required to have a transient lifetime and an indication of when they will be invalidated by the Producer due to inactivity.

5.2.1 Caching of markup fragments

For performance reasons the Consumer might prefer to cache the output of **getMarkup()** across a series of requests. The Producer passes information about the cachability of the markup fragment returned by **getMarkup()** in the `cacheControl` structure returned in `MarkupResponse`. The Consumer can infer from this information when it may cache markup and when the cached markup needs to be invalidated and updated by a new call to **getMarkup()**.

5.2.1.1 Cachability

Whenever the `cacheControl` field of `MarkupResponse` is filled in the Consumer MAY cache the markup fragment. The Consumer MUST follow the defined invalidation policies to keep the cache up-to-date. If the `cacheControl` field is empty the Consumer MUST NOT cache the markup fragment.

5.2.1.2 Cache Invalidation

The Consumer knows when to invalidate its cached fragments from one of the following mechanisms:

- Time based expiry: The Consumer MUST expire a markup fragment after the duration indicated in `markupExpires` (returned in the `cacheControl` of `MarkupResponse`) has timed out, counting from the point in time when the **getMarkup()** invocation returned. If the value of `markupExpires` equals -1 the fragment will never time out. If the value of `markupExpires` equals zero the fragment MUST NOT be cached.
- Hint based expiry: The Producer MAY return hints to the Consumer as to what input parameters the generated markup depends on (see definition of the `cacheControl` structure). The Consumer MUST use these hints to invalidate the cached fragments if the designated input parameters changed since the request that resulted in the last invocation of **getMarkup()**.
- State based expiry: The Consumer MUST expire the markup fragment if parts of the Consumer managed state of the entity changed. This includes changes in the `windowState`, `mode`, `navigationalState` and `entityState`. These attributes are not included in the semantics of the `CACHE_MARKUP_PARAMS` hint.
- Action based expiry: An invocation of **performInteraction()** MUST invalidate all cache entries for the targeted entity or `refHandle`.

5.3 performInteraction() Operation

End-User interactions with the generated markup may result in invocations for the entity to respond to the interactions [A400]. In the case where these may change the `navigationalState` or some data the entity is storing in a shared data area (including a database), a blocking call is needed to process the interaction prior to markup being generated for a page refresh to the End-User. Therefore this blocking operation is defined for processing interaction and the state changes they may cause:

```
interactionResponse = performInteraction(refHandle, _groupID_1registrationContext,
                                         entityContext, userContext,
                                         markupParams, interactionParams)
```

Since this is a blocking operation, the Consumer MUST wait for the response before invoking **getMarkup()** on the entities it is aggregating. This permits any Producer-mediated sharing to proceed safely (provided it happens in a synchronous manner). Since this is the operation that potentially returns state to the Consumer for storage, this also allows Consumers who wish to store this by pushing it to their client to do so before opening the stream for the aggregated page. This also enables End-User bookmarking of the page for later use.

5.3.1 Updating Persistent Entity State

In designing how an entity and Consumer interact in order to update the persistent state of the entity, the following items were considered:

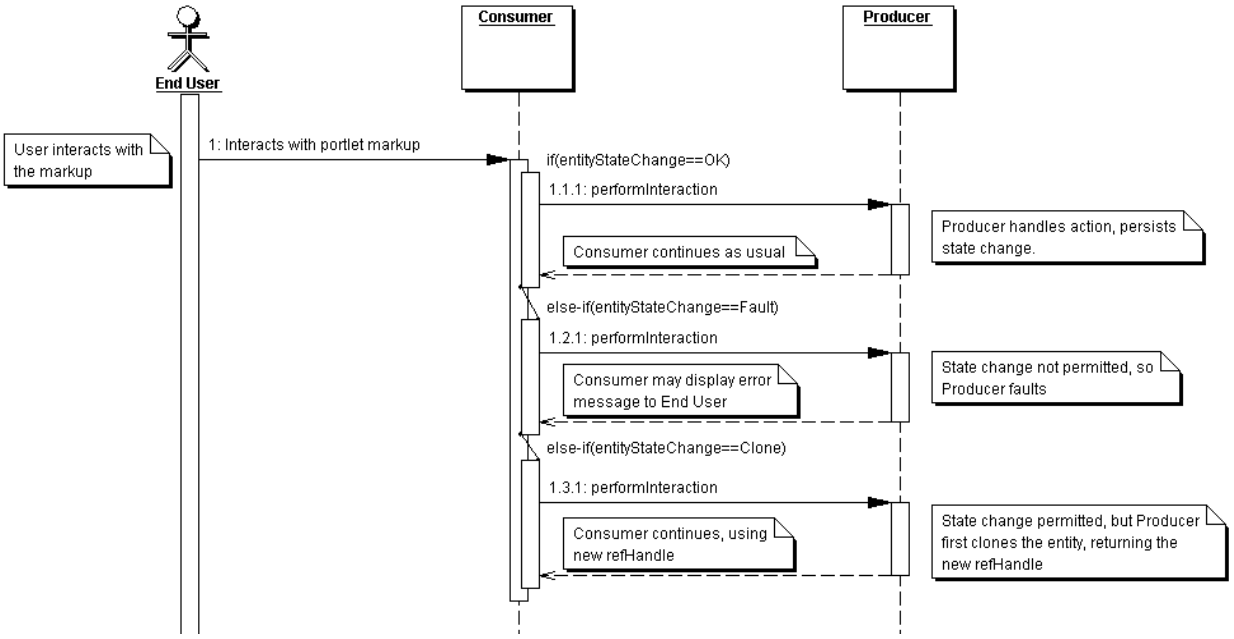
1. Only the entity knows when such a state change is desired. While it is expected that changes to persistent state will be relatively rare, they could occur on any interaction the entity has with an End-User.
2. Only the Consumer knows whether or not a persistent state change would be safe. Reasons for this include whether the persistent state is shared among a group of users, the authorization level of the End-User to impact any shared persistent state and Consumer policies regarding whether the persistent state is modifiable.

This combination requires that all persistent entity state changes happen in a manner that has Consumer approval for the change to occur, while the entity decides both when the change is required and its exact character. The `entityStateChange` flag in the `interactionParams` parameter to the **performInteraction()** operation indicates whether or not it is safe for the entity to modify its persistent state. If the Consumer has set the `entityStateChange` flag to 'OK', the entity MAY modify its persistent state regardless of whether it is persisted on the Producer or Consumer.

If the Consumer has set the `entityStateChange` flag to 'Clone', the Producer may clone the entity on an attempt to modify its persistent state and return the impacts of this cloning to the Consumer, regardless of whether the `entityState` is persisted on the Producer or Consumer. Since the `refHandle` used to refer to the runtime state of the entity likely encodes the configuration of the entity, it is anticipated that in addition to a new `entityHandle` the Producer will likely return a new `refHandle`, even if that which the `refHandle` refers to is unchanged.

If the Consumer has set the `entityStateChange` flag to 'Fault', the entity MUST NOT modify its persistent state regardless of whether it is persisted on the Producer or Consumer and MUST throw a fault message if processing the interaction requires changing its persistent state. Commonly Consumer's will only set the `entityStateChange` flag to 'Fault' for End-Users that are not authorized to clone or personalize the entity (e.g. an End-User using a guest account).

This set of possibilities is depicted in the following figure:



5.4 initEnvironment() Operation

In general, the Producer implicitly manages its own environment. There are cases, however, when assistance from the Consumer in initializing the environment is useful. Initializing any Producer mediated sharing prior to (potentially concurrent) requests for markup can greatly simplify the Producer's complexity in managing the environment. The Producer indicates it is interested in this assistance from the Consumer by setting the `doInitEnvironment` flag to true in the `ServiceDescription` structure returned by **getServiceDescription()**. This operation is how the Consumer provides such assistance:

```
Extension initEnvironment(registrationContext, groupID);
```

If the Producer's metadata has set the `doInitEnvironment` flag to true, then the Consumer MUST invoke **initEnvironment()** once for each unique `groupID` (`groupID` is specified in the entitys' metadata) associated with the entities Consumer is using, prior to invoking **getMarkup()** for this End-User for any of these entities. The Consumer MAY invoke **initEnvironment()** concurrently, each with a different `groupID`. If at any time the Producer throws a fault message ("WSRP.Interface.InvalidEnvironment") indicating the environment for this `groupID` with this End-User has been invalidated at the Producer, then the Consumer MUST again invoke **initEnvironment()** for this `groupID` and SHOULD then reprocess the invocation that caused the fault message to be thrown. The Consumer MUST associate any returned data or transport information (e.g. HTTP cookies) with this grouping of entities and return them to the Producer on invocations of targeting any entity sharing this `groupID`.

An example of the usefulness of this operation is a portal page with multiple entities from a Producer involved in a series of interactions, all tied to a single `groupID` (i.e. may be involved in Producer-mediated data sharing). Since portals usually issue concurrent requests to each of the entities represented on the page, the complexity of properly initializing the Producer's environment is significant, particularly if operating in a load-balanced environment (as discussed in the next section). If the Producer set the `doInitEnvironment` flag to true, then the Consumer MUST assist the Producer by invoking this operation once per `groupID`, and block any other invocation, on behalf of this End-User, that is targeted at any entity sharing the same `groupID` until this invocation returns. Failure to do so will often result in the entities not interacting with each other in the expected manner.

5.4.1 Load Balancing

Load balancing is a part of the Producer environment that cannot easily be managed from within the protocol. Load balancing is highly dependent on mechanisms in the transport, for example the use of cookies in HTTP. In order to permit load balancing to function, regardless of the transport binding in use, the Consumer MUST manage transport level issues itself. Using HTTP as an example, if the Producer requires such support of Consumers, it MUST indicate so by setting the `requiresCookieSupport` metadata flag to 'true'. If the Producer set the `requiresCookieSupport` flag to 'true', the Consumer MUST ensure the cookies are properly supplied in subsequent requests for the End-User. In addition, The Consumer MUST supply any cookies set during an **initEnvironment()** invocation on later invocations for entities within that group.

5.4.2 Consumer Transitions across Bindings

Consumers SHOULD be careful about the support supplied by the web stack with regards to multiple bindings that will be offered by many Producers. If a Producer indicates that it uses cookies, the Consumer MUST ensure that any cookies the Producer sets are available on all invocations regardless of whether the operation is in the same binding that set the cookie. Another implication of the Producer indicating it uses cookies is that the Consumer SHOULD NOT do any protocol transitions (e.g. from HTTP to HTTPS) as cookies are often managed in a manner that does not allow the information to be shared across such a transition. Switching between protocols (e.g., going from HTTP to HTTPS) will likely break load balancing on the Producer. This is because the request being routed via the new binding will almost certainly go through a different load balancer and likely a different session manager. In addition, since providing the information stored in cookies when using HTTPS for a later HTTP connection opens security issues, Consumers MUST NOT move cookies from an HTTPS service endpoint to an HTTP service endpoint.

5.5 Stateful Entity Scenarios

There are several common scenarios for entities with varying needs regarding statefulness [A202][A203]. This section explains how they map into the operational signatures above.

5.5.1 No State

This type of entity maintains no state, but encodes everything required to generate the markup on the URL causing the invocation of **getMarkup()** [A201]. Often these entities involve only a single page, but could provide links on that page that cause the generation of a completely different markup due to the parameters passed when the link is activated.

Note: Invocations of **performInteraction()** MAY happen in this scenario if the entity impacts some backend system as a result of the invocation as this impact could change the markup some other entity will generate.

The following table outlines the values for certain key parameters that support this scenario.

Method	Parameter/Field	Value	Comments
performInteraction	refHandle	Producer_Offered_Entity or Consumer_Configured_Entity	No Producer-side state, so this handle never changes.
	markupParameters / navigationalState	Consumer extracts value from link.	Navigational state encoded on the URLs in the markup only.
	interactionResponse / navigationalState	This type entity does not return navigationalState.	
getMarkup	refHandle	Producer_Offered_Entity or Consumer_Configured_Entity	No Producer-side state, so no refined handle is ever generated.
	markupParameters / navigationalState	Consumer extracts value from link.	Navigational state from the URL.

5.5.2 Navigational State Only

This type of entity does not maintain state at the Producer, but does push navigational state out to the Consumer. Both to support these entities and to assist Consumers in properly supporting End-User page refreshes and bookmarks, entities are allowed to return their navigational state (`navigationalState` field) back to the Consumer. It is then the responsibility of the Consumer to retransmit the `navigationalState` to the Producer with each request [A206].

A stateless Consumer can store the `navigationalState` for all of its aggregated entities by returning them to the client, for example by encoding them in the URL. Since this implementation option requires the URL to be generated before the output stream is opened, the `navigationalState` of all entities must be known before the Consumer begins generating the output stream. In order to allow the Consumer to open the output stream before it has collected markup from all entities aggregated on the page, a **`getMarkup()`** invocation is not allowed to modify the `navigationalState`. Only an invocation of **`performInteraction()`** is allowed to modify the `navigationalState` of an entity.

The following table outlines the values for certain key parameters that support this scenario.

Method	Parameter/Field	Value	Comments
performInteraction	refHandle	Producer_Offered_Entity or Consumer_Configured_Entity	No Producer-side state, so this handle never changes.
	markupParameters / navigationalState	Consumer extracts value from link or previous value.	
	interactionResponse / navigationalState	Entity may compute a changed navigationalState.	
getMarkup	refHandle	Producer_Offered_Entity or Consumer_Configured_Entity	No Producer-side state, so no refined handle is ever generated.
	markupParameters / navigationalState	From link or previous value or from performInteraction.	

5.5.3 Local state

Entities storing state locally on the Producer establish a **Session** and return an opaque reference (a `refHandle` refinement on the underlying `entityHandle`) the Consumer is then required to return on all subsequent invocations on the entity for this End-User. These entities MAY also push navigational state to the Consumer such that an End-User may bookmark some portion of the state for use in later conversations. The means by which the Consumer enables this functionality for the End-User is a Consumer implementation choice [A304].

The following table outlines the values for certain key parameters that support this scenario.

Method	Parameter/Field	Value	Comments
performInteraction	refHandle	Producer_Offered_Entity or Consumer_Configured_Entity or refined handle that also encodes session info	With Producer side state, the refined handle offers ability to store information without impacts message size to Consumer.
	markupParameters / navigationalState	Consumer extracts value from link or previous value.	
	interactionResponse / navigationalState	Entity may compute a changed navigationalState.	
getMarkup	refHandle	Producer_Offered_Entity or Consumer_Configured_Entity or refined handle that also encodes session info	With Producer side state, the refined handle offers ability to store information without impacts message size to Consumer.
	markupParameters / navigationalState	From link or previous value or from performInteraction.	

5.6 Modes

An entity should render different content and perform different activities depending on its current state, the operation (with parameters) currently being processed, and the functionality requested by the End-User. A base set of functions is defined which reflects those common for portal-portlet interactions. They are referred to as modes and should be thought of as how the Consumer is managing the interaction with the End-User. Entities may request mode changes either through parameters on a link that an End-User activates or by returning a `newMode` from **performInteraction()**. Whether or not such a request is honored is up to the Consumer and often will depend on access control settings for the End-User.

An entity must support the `VIEW` mode and may support the modes `EDIT`, `HELP`, `CONFIG` and `PREVIEW`. During **getMarkup()** and **performInteraction()** invocations the Consumer indicates to the entity its current mode via the `MarkupParams` data structure.

5.6.1 VIEW Mode

The expected functionality for an entity in `VIEW` mode is to render markup reflecting the current state of the entity. The `VIEW` mode of an entity will include one or more screens that the End-User can navigate and interact with or it may consist of static content devoid of user interactions.

The behavior and the generated content of an entity in the `VIEW` mode may depend on configuration, personalization and all forms of state.

All entities must support the `VIEW` mode.

5.6.2 EDIT Mode

Within the `EDIT` mode, an entity should provide content and logic that let a user customize the behavior of the entity. The `EDIT` mode may include one or more screens which users can navigate to enter their customization data.

Typically, entities in `EDIT` mode will set or update entity state by making these changes persistent for the entity. How such changes impact Consumer management of entity usage by End-Users is discussed in section 5.3.1.

5.6.3 HELP Mode

When in `HELP` mode, an entity may provide a simple help screen that explains the entity and its expected usage. Some entities will provide context-sensitive help based on the markup the End-User was viewing when entering this mode.

5.6.4 CONFIG Mode

Within the `CONFIG` mode, an entity should provide content and logic that let a user with administrator privileges (Administrator portletRole, or equivalent) customize the behavior of the entity. The `CONFIG` mode may include one or more screens which users can navigate to enter their customization data.

Typically, entities in `CONFIG` mode will set or update entity state by making these changes persistent for the entity.

5.6.5 PREVIEW Mode

In PREVIEW, an entity should provide a rendering of its standard VIEW mode content, as a visual sample of how this entity will appear on the End-User's page with the current configuration. This could be useful for a Consumer that offers an advanced layout capability, for example.

5.6.6 Custom Modes

The extensible `RegistrationData` structure provides a field for Consumers to declare additional custom modes. In addition, the extensible `EntityDescription` structure provides a field for entities to declare what modes they understand. A Consumer SHOULD NOT set a mode an entity does not understand. An entity MUST map any mode it does not understand to `VIEW_MODE`.

5.7 Window States

Window state is an indicator of the amount of page space that will be assigned to the content generated by an entity. This hint is provided by the Consumer for the entity to use when deciding how much information to render in the generated markup.

An entity MUST support the `VIEW_NORMAL` window state and SHOULD support the `VIEW_MINIMIZED` and `VIEW_MAXIMIZED` window states.

5.7.1 NORMAL Window State

The `VIEW_NORMAL` window state indicates the entity is likely sharing the aggregated page with other entities. It MAY also indicate that the target device has limited display capabilities. Therefore, an entity SHOULD restrict the size of its rendered output in this window state.

All entities MUST support the `VIEW_NORMAL` window state.

5.7.2 MINIMIZED Window State

When the window state is `VIEW_MINIMIZED`, the entity SHOULD render itself using minimal space. The entity SHOULD render no visible markup in this case, but is free to include non-visible data such as javascript or hidden forms. The Consumer MUST invoke the **getMarkup()** operation for the `VIEW_MINIMIZED` state just as for all other window states. The Consumer MAY render the title, controls and decorations related to the entity.

5.7.3 MAXIMIZED Window State

The `VIEW_MAXIMIZED` window state is an indication the entity is likely the only entity being rendered in the aggregated page, or that the entity has more space compared to other entities in the aggregated page. An entity SHOULD generate richer content when its window state is `VIEW_MAXIMIZED`.

5.7.4 Custom Window States

The extensible `RegistrationData` structure provides a field for Consumers to declare additional custom window states. In addition, the extensible `EntityDescription` structure contains a field for entities to declare what window states they understand. A Consumer SHOULD NOT set a window state an entity does not understand. An entity MUST map any window state it does not understand to `VIEW_NORMAL`.

6 Registration Interface

A Producer that supports in-band registration of Consumers exposes the optional registration portType. Regardless of whether or not the registration portType is exposed, Producers MAY offer out-of-band processes to register a Consumer. All Producer registration processes MUST result in a unique, opaque token that may be used to refer to the registration. This specification calls this token a `registrationHandle` (defined in section 4.1.5).

6.1 New Data Structures

The operations in this section introduce the following new data structures:

6.1.1 RegistrationData

The `RegistrationData` structure provides the means for the Consumer to supply the data required for registration with a Producer as well as protocol extensions that it supports [R355][R356].

```
RegistrationData
    [R] String       consumerName
    [R] String       consumerVendor
    [O] String[]     userProfileExtensions
    [O] String[]     consumerModes
    [O] String[]     consumerWindowStates
    [O] String[]     consumerExtensions
    [O] Property[]   registrationProperties
    [O] Extension[]  extensions
```

Members:

- `consumerName`: A name (preferably unique) that identifies the Consumer [R355]. An example of such a name would be the Consumer's URL.
- `consumerVendor`: Name and version of the Consumer's vendor [R356]. [RT: Do we want to define a particular format here?]
- `userProfileExtensions`: An array of named extensions to the user profile structures defined in this specification. While this specification does not provide any such named extensions, it is expected that vendors will define named sets (e.g. SAP-R3-UserProfile).
- `consumerModes`: An array of modes the Consumer is willing to manage. This specification defines a set of constants for a base set of modes (see section 13). This array may reference both those constants and additional custom modes of the Consumer.
- `consumerWindowStates`: An array of window states the Consumer is willing to manage. This specification defines a set of constants for a base set of window states (see section 13). This array may reference both those constants and additional custom window states of the Consumer.
- `consumerExtensions`: An array of named extensions the Consumer supports. While this specification does not define what extensions exist, this field allows the Consumer to supply this information to the Producer at registration.
- `registrationProperties`: List of registration properties. The names of these properties SHOULD be from the set declared in the RegistrationData array from the Producer's service description and are not part of this specification.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

6.2 register() Operation

Registration describes the transition between Producer state 1 (known) and state 2 (active) [R352]. The Consumer establishes a relationship with the Producer that will be referenced via an opaque handle in subsequent invocations the Consumer makes of the Producer within this relationship [R350]. Both the Consumer and the Producer are free to end this relationship at any time [R500]. When the Consumer chooses to end the relationship, it MUST attempt an invocation of the **deregister()** operation so that the Producer may release related resources. The Producer MAY end the registration by invalidating the registration identifier and MUST inform the Consumer of this through a fault message on the next invocation so that the Consumer may release related resources.

```
registrationContext = register(registrationData);
```

The returned `registrationContext` is used in all subsequent invocations to reference this registration [R362]. If the Producer's metadata declares registration is not supported (i.e. `requiresRegistration` flag was set to false), then it is valid to pass null to operations that require a `registrationContext`. If the registration fails (e.g. failed authentication), a fault message MUST be thrown indicating this to the Consumer [R363].

A Consumer MAY register itself multiple times to a Producer with potentially different settings (e.g. security settings) resulting in multiple `registrationHandles` [R351]. Different registration contexts MUST be identified by different `registrationHandles`.

6.3 modifyRegistration() Operation

This operation provides means for the Consumer to modify a relationship with a Producer [R353].

```
registrationState = modifyRegistration(registrationContext, registrationData);
```

The supplied parameters reference a pre-existing registration and the modifications desired. If the Producer chooses to have the Consumer provide persistent storage, the change in registration state is carried in the `registrationState` field of the returned `RegistrationState` structure.

6.4 deregister() Operation

This operation provides means for the Consumer to end a relationship with a Producer.

```
Extension[] deregister(registrationContext);
```

After this operation is invoked, all handles created within the context of the `registrationContext` become invalid [R500][R501][R503]. It is a Producer implementation choice whether this immediately aborts in progress operations or waits until all transient resources time out. In either case, a Consumer MUST NOT attempt to use the invalidated `registrationContext` for subsequent invocations. An attempt to use an invalidated `registrationContext` MUST throw a fault indicating the registration is not valid. If the **deregister()** operation fails, the Producer MUST throw a fault message specifying the reason for the failure.

7 Entity Management Interface

Producers MUST expose 1 or more logically distinct ways of generating markup and dealing with interaction with that markup [A205], which this specification refers to as **Entities**. The Producer declares the entities it exposes through its description [A104]. This declaration contains a number of descriptive parameters; in particular it includes an `entityHandle` that Consumers use to refer to the so-called "ProducerOfferedEntity". These entities are pre-configured and non-modifiable by Consumers.

In addition to the ProducerOfferedEntities, a Producer MAY expose the EntityManagement portType and thereby allow Consumers to clone and customize the entities the Producer offers. A Consumer MAY request a unique configuration of one of these entities either in an opaque manner (e.g. the 'edit' button common on aggregated pages which invokes an entity-generated page for setting the configuration) or by using the property definitions found in the entity's metadata to configure it in an explicit manner [R600]. Such a configured entity is called a "ConsumerConfiguredEntity".

7.1 New Data Structures

The operations in this section introduce the following new data structures:

7.1.1 EntityDescription

The `EntityDescription` structure contains a set of fields that provide the metadata to describe the entity.

EntityDescription	
[R] Handle	entityHandle
[R] LocaleData[]	locales
[R] String[]	markupTypes
[O] String[]	markupLocales
[O] anyURI	wsdlURL
[O] String	groupID
[O] String[]	modes
[O] String[]	windowStates
[O] String[]	producerRoles
[O] String[]	userProfileItems
[O] Integer	needSecureCommunications
[O] boolean	userContextStoredInSession
[O] boolean	templatesStoredInSession
[O] boolean	hasUserSpecificState
[O] boolean	doesUrlTemplateProcessing
[O] Extension[]	extensions

Members:

- `entityHandle`: The handle by which Consumers MAY refer to this offered entity.
- `locales`: A array of locale-specific data.
- `markupTypes`: The different markup languages supported by the entity, e.g. *HTML, XHTML, WML, VoiceXML, cHTML, …*
- `markupLocales`: The list of locales for which this entity is willing to generate markup.
- `wsdlURL`: The URL for the WSDL description of this entity.
- `groupID`: Identifier for the group within which the Producer places this entity or any entities derived from it via the cloning process.

- `modes`: The modes that are supported by the entity (e.g. *view, edit, config, help, preview)*. Mode constants are defined elsewhere in this section. In addition the portlet can define its own modes.
- `windowStates`: The windowStates that are supported by the entity (e.g. m*inimized, normal, maximized, detached)*. These constants are is defined elsewhere in this section.
- `producerRoles`: Array of localized names for the Producer's roles that the entity can manage. Note: This support MAY be provided by the Producer service on behalf of the entity. Each roles defined by the entity MUST have a `RoleDescription` available to the Consumer through the Producer's `ServiceDescription`. [R416]
- `userProfileItems`: An array of XPath-like strings that enumerate what portions of the `UserContext` structure the entity needs to provide full functionality. For the fields this specification defines, the named profile items an entity uses MUST all come from the "Profile Name" column of the table found in section 10.
- `needSecureCommunications` Flag that indicates whether this entity requires secure communications on all hops from the End-User to the entity, for either its markup or user interactions. Possible values are: 0 = secure client communications not needed (default value), 1 = secure client communications needed by some markup or user interactions, and 2 = secure client communications required for all markup and user interactions.
- `userContextStoredInSession`: A flag indicating the entity will store any supplied `UserContext` in the current session. Setting this flag to 'true' allows the Consumer to optimize when the `UserContext` is included on operation invocations. Since some data in the `UserContext` is sensitive, many Consumers will require that secure communications be used when the information is passed. Not requiring this of all invocations can result in a significant performance difference. The default value of this flag is 'false'.
- `templatesStoredInSession`: A flag indicating the entity will store any supplied `templates` in the current session. Setting this flag to 'true' allows the Consumer to optimize when the `templates` structure is included on **getMarkup()** invocations. Since the content of the `templates` structure can get quite large, not requiring it to be passed on all **getMarkup()** invocations can result in a significant performance difference. The default value of this flag is 'false'.
- `hasUserSpecificState`: A flag indicating the entity will store persistent state specific to each End-User. For entities setting this flag to true, Consumers MAY choose to clone the entity when it is placed on an aggregated page rather than waiting for the fault message processing described in section 5.3.1. The default value of this flag is 'false'.
- `doesUrlTemplateProcessing`: A flag indicating the entity will process any `templates` supplied so as to correctly write URLs in its markup. For entities setting this flag to true, Consumers MUST provide the URL writing templates. The default value of this flag is 'false'.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

7.1.2 EntityHandle

The `entityHandle` parameter supplies a unique, opaque reference for the Producer to determine what descriptive information to return. For Producer_Offered_Entities this reference may be extracted from the array on `EntityDescriptions` in the response to **getServiceDescription()**. For Consumer_Configured_Entities this reference is returned from a **cloneEntity()** invocation. Once established, an `entityHandle` MUST be invariant until it is released.

String	entityHandle

7.1.3 RefHandleContext

The `RefHandleContext` structure contains fields that may be returned in response to invocations of a number of different operations.

RefHandleContext		
	[R] String	newRefHandle
	[R] int	refHandleExpires
	[O] Extension[]	extensions

Members:

- `newRefHandle`: A new transient and opaque handle the Producer is supplying for use on future invocations for this use of the entity. The Consumer MUST use this new value as the `refHandle` on subsequent invocations until either the Producer supplies another `newRefHandle` or the `refHandle` is becomes invalid by either the `refHandleExpires` duration expiring or a fault message from the Producer [A206]. Note that failures to use this handle on subsequent invocations (e.g. something exceptional caused the Consumer to lose track of it) will result in a loss of state and likely unexpected behavior for the End-User.
- `refHandleExpires`: An integer value for the number of seconds before the `newRefHandle` will be "timed out" by the Producer and the resources reclaimed. A value of –1 means the Producer does not time out the resource referred to by `newRefHandle`. The Producer MUST NOT return a value for `refHandleExpires` of 0 or negative numbers besides –1 as these have no meaning to the Consumer. This field has no default value. The Producer MUST supply this value whenever it supplies a `newRefHandle`.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

7.1.4 EntityResponse

The `EntityResponse` structure contains fields returned by the **cloneEntity()** operation.

EntityResponse		
	[R] String	entityHandle
	[O] String	entityState
	[O] Extension[]	extensions

Members:

- `entityHandle`: An opaque and invariant handle that is unique within the context of the Consumer's registration which the Producer is supplying for use on future invocations targeted at the new entity.
- `entityState`: An opaque string the entity uses when it depends on the Consumer to store its persistent state [A205]. If `entityState` has a non-null value, the Consumer MUST return this value on subsequent calls using the same `entityHandle`. Note that such uses MAY span various cycling of the Consumer and therefore this state MUST be persisted by the Consumer until successfully invoking **destroyEntities()** with the related `entityHandle`.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

7.1.5 PropertyList

A `PropertyList` gathers an array of Property structures together for transmitting between the Consumer and Producer.

```
PropertyList
    [R] Property[]   property
    [O] Extension[]  extensions
```

Members:

- `property`: Each member in this array is a `Property` structure carrying information concerning one property.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

7.1.6 PropertyDescription

Each property of an entity is described using the following structure.

```
PropertyDescription
    [R] String       name
    [O] String       type
    [O] Extension[]  extensions
```

Members:

- `name`: Name of the property, must not be null.
- `type`: Type of the property, default value = xsd:string.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

7.1.7 ModelDescription

The set of properties of an entity are described in its metadata using the following structure.

```
ModelDescription
    [R] PropertyDescription[]   propertyDescriptions
    [O] Schema                  schema
    [O] Extension[]             extensions
```

Members:

- `propertyDescriptions`: Array of property descriptions, must not be null.

- `schema`: An XML schema defining any entity-specific datatypes referenced in the `propertyDescriptions`.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

7.2 getEntityDescription() Operation

This operation allows a Producer to provide information about the entities it offers in a context-sensitive manner.

```
entityDescription = getEntityDescription(entityHandle, registrationContext,
                                         entityContext, userContext);
```

Producers may choose to restrict the information returned in `entityDescription` based on the supplied registration and user contexts. Consumers may choose to alter how they interact with an entity based on the metadata contained in the returned `entityDescription`.

7.3 cloneEntity() Operation

This operation allows the Consumer to request the creation of a new entity from an existing entity.

```
entityResponse = cloneEntity(entityHandle, registrationContext, entityContext,
                             userContext);
```

The supplied `refHandle` MUST refer to a refined handle on either a Producer_Offered_Entity or a previously cloned Consumer_Configured_Entity. The initial state of the new entity MUST be equivalent to the state of the entity the supplied handle references. In the case of a Consumer_Configured_Entity that pushes the entity's persistent state to the Consumer, the `entityState` field of the `entityResponse` structure will supply that state. The new `entityHandle` MUST be scoped by the `registrationHandle` in the supplied `registrationContext` and be unique within this registration.

If a Producer chooses to push the persistent state of its entities to the Consumer, it is recommended that the handle referring to the entity encode the `registrationHandle` that scopes the `entityHandle`. It is also recommended, in this case, that the `entityState` encode the `entityHandle` so that the Producer can do reasonable cross checks that it is receiving a consistent set of handles and state.

The returned `entityResponse` contains both the `entityHandle` and `entityState` fields for use in subsequent invocations on the configured entity. No relationship between the supplied entity and the new entity is defined by this specification. The Consumer MUST attempt to release the new `entityHandle` by invoking **destroyEntities()** when it is no longer needed.

If the Producer's metadata declares registration is not supported (i.e. `requiresRegistration` flag was set to false), then the Consumer MUST invoke **destroyEntities()** when it would have deregistered, passing each `entityHandle` that would have been scoped by a registration.

7.4 destroyEntities() Operation

The Consumer MUST inform the Producer that a Consumer_Configured_Entity will no longer be used by invoking this operation.

```
extensions destroyEntities(registrationContext, entityHandles);
```

The supplied `entityHandles` is an array of type `entityHandle`, each of which the Consumer is informing the Producer it will no longer use. The Producer MUST throw a fault message if not all of the supplied `entityHandles` are scoped by the supplied `registrationContext`. It is a choice of the Producer's implementation whether the resources related to the `entityHandles` are immediately reclaimed or whether transient resources are allowed to timeout first. A Consumer MUST NOT reference any of the supplied `entityHandles` after successfully invoking **destroyEntities()** and MAY reclaim resources related to the supplied `entityHandles` (e.g. `entityState`). If a fault message is generated in the processing of **destroyEntities()**, then the Producer MUST NOT invalidate any of the supplied `entityHandles`. While a `refHandle` is a refinement on an `entityHandle`, Consumers MUST NOT pass `refHandles` to **destroyEntities()**, as the purpose of this operation is destroying the persistent entity and a `refHandle` refers to a transient refinement on such an entity.

7.5 setEntityProperties() Operation

The entity state in the previous operations was opaque to the Consumer (e.g. as `entityState`). In addition, means are defined by which a Producer may publish information about state in an entity-specific manner. This is enabled through **Properties** that are declared in the metadata specific to an entity. Each property declaration includes a name and type (default = `xsd:string`) [A505][A507]. This operation enables the Consumer to interact with this published portion of an entity's state.

```
entityResponse = setEntityProperties(entityHandle, registrationContext,
                                     entityContext, userContext, propertyList);
```

Since **setEntityProperties()** is interacting only with the published portion of the entity's state, it MUST always be safe for the entity to modify its state (i.e. equivalent to `entityStateChange` set to 'OK' for a **performInteraction()** invocation).

7.6 getEntityProperties() Operation

This operation provides the means for the Consumer to fetch the current values of the published entity's properties. The intention is to allow a Consumer-generated user interface to display these for administrative purposes.

```
propertyList = getEntityProperties(entityHandle, registrationContext, entityContext,
                                   userContext, propertyList);
```

The supplied `propertyList` parameter declares the set of properties, the values of which the Consumer is requesting. Any values for the supplied `Property` elements are ignored; only their names are used to determine the queried set of properties. The returned `propertyList` declares the current values for these properties. If the Consumer passes a null `propertyList` parameter, the Producer MUST treat this as a request to enumerate the properties of the entity.

7.7 getEntityPropertyDescription() Operation

This operation allows the Consumer to discover the published properties of an entity and information (e.g. type and description) that could be useful in generating a user interface for editing the entity's configuration.

```
modelDescription = getEntityPropertyDescription(entityHandle, registrationContext,
                                                entityContext, userContext);
```

The `modelDescription` returned is a typed `property` view onto the portion of the entity's persistent state that the user (referenced through the `userContext`) is allowed to modify. While it is possible this set of properties change with time (entity dynamically creates new properties), Producers/entities SHOULD make the returned `modelDescription` as complete as possible.

8 Security

WSIA and WSRP compliant systems will be exposed to the same security issues as other web service systems. For a representative summary of security concerns, refer to the Security and Privacy Considerations document produced by the XML-Based Security Services Oasis TC.

It is a goal within this specification to leverage standards efforts that address web services security and to avoid defining mechanisms that will be redundant with those standards efforts. These standards generally fall into two main categories: document-level mechanisms and transport-level mechanisms.

The uses of document-level security mechanisms are not covered in this version of the specification since several important standards (particularly security policy declarations) are not yet available. Producers and Consumers wishing to apply document-level security techniques are encouraged to adhere to the mechanisms defined by WS-Security, SAML, XML-Signature, XML-Encryption, and related specifications. It is anticipated that as the web services security roadmap becomes more fully specified by standards, and support for those standards becomes widely available from infrastructure components, that these will play an important role in future versions of this specification.

For this version of the specification, emphasis is placed on using transport-level security standards (e.g. SSL/TLS) to address the security issues involved in Consumers invoking Producers on behalf of End-Users. These only require that a Producer's WSDL declare bindings for an HTTPS service entry point.

8.1 Authentication of Consumer

Producer authentication of a Consumer may be achieved at the transport level through the use of client certificates in conjunction with SSL/TLS. Certificate provisioning by a Producer to a Consumer happens outside the scope of this protocol, typically as part of establishing a business relationship between the Producer and Consumer.

8.2 Confidentiality & Message Integrity

SSL/TLS may be used to ensure the contents of messages are neither tampered with nor decipherable by an unauthorized third party. Consideration needs to be given to both the communication between Producer and Consumer and communication between the End-User client and the Consumer.

For Producer - Consumer communications, the Producer declares the use of SSL/TLS in the service's WSDL by declaring an HTTPS service endpoint.

For Consumer – End-User client communications, the Consumer indicates in the `MarkupParams` structure whether or not communications with the End-User are happening in a secure manner. The entity MAY choose to change behavior based on this value, for example it may generate markup that redirects the End-User to the equivalent secure page or throw a fault indicating secure client communications are required.

8.3 Access control

A Consumer MAY implement access control mechanisms that restrict which End-Users may access which entities and operations on those entities. Additionally, a Producer MAY implement access control programmatically through the use of either a federated user identity or Producer roles. A standard set of roles is defined to facilitate easy mapping of common roles. In addition, a Producer's `ServiceDescription` MAY declare support for additional roles. If a Producer declares such roles, a Consumer MAY map End-Users to those roles in any manner it chooses, including ignoring them. Producers that use roles (standard or custom) SHOULD implement appropriate default behavior in the event a Consumer does not assert any role for the End-User.

8.4 Producer Roles

A Producer declares the `producerRoles` each entity is capable of supporting in the `EntityDescription` structure described in section 7.1.1.

8.4.1 Role Assertions

When a Producer declares roles for an offered entity, Consumers SHOULD assert roles for End-Users when interacting with that entity and any entities cloned from it. The Consumer controls the mechanism by which an End-User is mapped to entity roles.

8.4.2 Standard Roles

To ease the mapping of End-Users to roles and to facilitate plug-and-play, the following standard role names are provided along with an abstract definition of semantics associated with each. These definitions suggest progressively restrictive levels of access to the entity and are provided as guidelines only. The specific semantics of these roles are left to each Producer's implementation.

Administrator:	This role typically grants the highest level of access to functionality of an entity.
User:	This role is typically associated with End-Users who may personalize some set of properties for an entity.
Guest:	This role is typically associated with End-Users who may view an entity on a page but not modify any of its properties

---

9 Markup

This section covers the issues related to entities generating markup that Consumers could safely aggregate into a page and then properly process End-User interactions [A301].

9.1 Encoding

The Consumer MUST indicate to the entity the preferred character encoding, using the `characterSet` field of the `markupParams` structure. It is up to the entity to generate markup that complies with this encoding. The entity may generate markup in the UTF-8 character set encoding if it is unable to generate the requested `characterSet`. If it is unable to generate markup in either of these character sets, the entity MUST return a fault message to the Consumer. The Producer MUST use the same character set for the XML response message as was used to generate the markup.

9.2 URL Considerations

As part of its markup, an entity will often need to create URLs that reference the entity itself. For example, when an End-User activates one of these URLs, by clicking a link or submitting a form, the result should be a new invocation targeted to the entity. This section deals with the different possibilities for how the entity can encode these URLs in its markup.

URLs embedded in a markup fragment often cannot (or should not) be direct links to the Producer for a number of reasons:

- URLs the entity writes in its markup will be invoked or accessed by the End-User operating on the client. In the general case however it is only guaranteed that the client has direct access to the Consumer; the Producer may be shielded from the client via a firewall. So the Consumer needs to intercept URLs and route them to the Producer [A103].
- The Consumer may want to intercept URLs to perform additional operations, enrich the request with context information or do some book keeping
- The client might not be able to directly invoke the Producer, e.g. if the client is a browser that cannot issue SOAP requests to the Producer but can only talk HTTP to the Consumer. In this case the Consumer must translate the request into the correct protocol.

This implies that URLs must be encoded so that the Consumer intercepts them and re-routes them to the correct entity at the Producer, including the proper context. Because the same entity can be instantiated more than once in a single page, encoded URLs will have to allow the Consumer to track the entity to which the request is targeted. The problem is that the Producer requires Consumer-dependent information to write such a link. In principle there exist two options to make the encoded URLs point back to the Consumer and consist of all necessary information for the Consumer to properly process the activation of an URL:

- The Consumer can pass information on its context to the entity. The entity exploits this information during URL encoding so the resulting URL can be passed without further modification to the client. The advantages of this technique are efficiency and exploitation of these settings, even in client-side scripting. The disadvantage is that the entity will not be able to serve static content as the content depends on Consumer runtime settings.
- The entity can use a special syntax to encode its URLs. It is then the task of the Consumer to detect URLs in the markup and modify them according to its requirements. The markup generated by the entity is now Consumer-independent, allowing the entity to exploit caching mechanisms or even to serve static content. However, the Consumer will be more complex, as it needs to parse the markup to locate and rewrite the URLs, requiring extra processing time. Consumers SHOULD seek to minimize this impact on performance by using efficient encoding and parsing mechanisms (for example, the Boyer-Moore algorithm).

As there is no clear advantage to either technique, both styles of URL encoding are supported (see sections 9.2.1 and 9.2.2). This facilitates the capabilities both of the Producer and the Consumer with regards to the ability to adapt the generated markup and requires that the following semantics be followed:

1. IF an entity's metadata declares it is willing to process URL templates, then the Consumer MUST supply templates for the entity to use.
2. IF an entity is unable to completely write the URLs for its markup, it MUST set the `needsUrlRewriting` flag in `MarkupResponse` to 'true'.

3. If the `needsUrlRewriting` flag in `MarkupResponse` is 'true', then the Consumer MUST parse the returned markup and rewrite URLs conforming to the definitions in Section 9 of this specification.

Note: In principle it would not be necessary to mark URLs in a special way. The Consumer could always analyze the markup semantically and syntactically, detect URLs and rewrite them. This approach however would be very difficult and time consuming to implement for the Consumer, for reasons including that such a rewriting algorithm would be dependent on the markup type and version. Therefore both the Consumer and the Producer URL writing scenarios are introduced for convenience.

Entities MUST adopt the following convention for including non-ASCII characters within URLs in order to comply with W3C recommendations.

1. Represent each character in UTF-8 (see [RFC2279]) as one or more bytes.
2. Escape these characters with the URI escaping mechanism (i.e., by converting each byte to %HH, where HH is the hexadecimal notation of the character value).

This procedure results in a syntactically legal URI (as defined in [RFC1738], section 2.2 or [RFC2141], section 2) that is independent of the character http://www.w3.org/TR/html40/charset.html - doc-char-set encoding to which the document carrying the URI may have been transcoded.

9.2.1 Consumer URL Writing

All URLs the Consumer needs to write are demarcated in the markup by a token (wsia:rewrite) both at the start (with a '?' appended to clearly delimit the start of the name/value pairs) and end (preceded by a '/' to form the end token) of the URL declaration. The Consumer will have to locate the start and end token in the markup stream and use the information between the tokens to write the URL correctly. Details on this URL writing process are Consumer-specific and out of scope for this specification. The content between this pair of tokens follows the pattern of a query string (name/value pairs separated by '&' characters) with several well-known parameter names specifying what the Consumer needs in order to both correctly write the URL and then process it when an End-User activates it. This results in an URL declaration of the form:

[3rd F2F: Change token to wsia:rewrite for now. Revisit value of less human readable token once an implementation is available to test the impact.]

```
wsia:rewrite?name1=value1&name2=value2 .../wsia:rewrite
```

The Consumer is NOT REQUIRED to process URLs not conforming to this format and MAY choose to pass them unchanged, replace them with error text, do a best effort processing or invalidate the entire markup fragment. The Consumer is NOT REQUIRED to process escaped characters in parameter names, but rather pass them unchanged to either the User Agent (during URL rewriting) or the Producer (during processing of an activated URL).

The following well-known parameter names (e.g. replacing name1 and name2 above) are defined:

9.2.1.1 wsia:navigationalState

The value of this parameter defines the navigational state the Consumer MUST send to the Producer when the URL is activated. If this parameter is missing, the Consumer MUST send the current navigational state.

9.2.1.2 wsia:mode

Activating this URL includes a request to change the `mode` parameter in `markupParams` into the mode specified as the value for this parameter name. This must be one of the modes detailed in section 5.6 or a custom mode the Consumer specified as supported during registration. The Consumer MUST process this URL request to change the mode prior to invoking operations on the entity. If the requested mode change is for an invalid or unavailable mode (e.g. policy prohibits this End-User from entering that mode), the Consumer SHOULD leave the mode unchanged.

9.2.1.3 wsia:windowState

Activating this URL includes a request to change the `windowState` parameter in `markupParams` into the window state specified as the value for this parameter name. This must be one of the values detailed in section 5.7 or a custom window state the Consumer specified as supported during registration. The Consumer MUST process this URL request to change the window state prior to invoking operations on the entity. If the requested window state change is for an invalid or unavailable window state (e.g. policy prohibits this End-User from entering that window state), the Consumer SHOULD leave the window state unchanged.

9.2.1.4 wsia:url

When the urlType parameter is “Resource”, this parameter provides the actual URL to the resource. Note that this needs to be an absolute URL as the resource fetch will likely use HTTP GET instead of a web service invocation. Also note that since this URL will appear as a parameter value, it will have to be doubly encoded so that special URL characters do not invalidate the processing of the enclosing URL.

9.2.1.5 wsia:token

When the urlType parameter is “Namespace”, this parameter provides the actual token that is to be namespaced.

9.2.1.6 wsia:urlType

This required parameter controls how the resulting URL is processed when activated. The following values are defined:

9.2.1.6.1 Action

Activation of the URL will result in an invocation of **processInteraction()** on the entity that generated the markup. Prior to invoking this method the Consumer MUST analyze the query string parameters of the URL to determine if a mode and/or window change is specified. The Consumer MUST process all mode and window state change requests invoking the operation. All query string parameters not defined by this specification MUST be passed to **processInteraction()** as `requestParameters`. In addition the Consumer MUST check for the presence of the `wsia:navigationalState` parameter. If this parameter is present its value MUST be passed in the `navigationalState` field of the `MarkupParams` structure. If there is no such parameter, the Consumer MUST supply the current navigational state of the entity instead.

9.2.1.6.2 Render

Activation of the URL will result in an invocation of **getMarkup()**. This mechanism permits an entity's markup to contain URLs, which do not involve changes to local state, to avoid the overhead of two-step processing by directly invoking **getMarkup()**. The URL MAY specify a `wsia:navigationalState` parameter different from the current `navigationalState` for the entity as this allows state changes resulting in different markup being rendered. The Consumer MUST pass all the URL's query string parameters not defined by this specification as `requestParameters` in the `MarkupParams` data structure.

9.2.1.6.3 Resource

Activation of the URL will result in the Consumer fetching the underlying resource, possibly in a cached manner, and returning it to the End-User. For the HTTP protocol this maps to a "get" on the underlying resource. The URL for the resource (including any query string parameters) is encoded as the value of the `wsia:url` parameter.

9.2.1.6.4 Namespace

This tells the Consumer that the "URL" contains a name that needs to be unique on the aggregated page (e.g. a form field's name or the name of a javascript method). While this is not technically a URL, providing this functionality in this manner limits the performance impacts of Consumer parsing to a single pass of the markup. The actual name that needs to be rewritten is encoded in the `wsia:token` parameter. See section 9.3 for more details on namespace rewriting.

9.2.1.7 wsia:secureURL

A boolean indicating the resulting URL should involve secure communications between the client and Consumer, as well as between the Consumer and Producer. The default value of this boolean is false.

9.2.1.8 wsia:rewriteResource

This boolean informs the Consumer that the resource needs to be parsed for URL rewriting. Normally this means that there are names that will be cross-referenced between the markup and this resource (e.g. javascript references). Note that this means the Consumer needs to deal with rewriting unique 'namespaced' names in a set of documents, rather than treating each individually. Consumers MAY want to process such resources in a manner that allows caching of the resulting resource by the End-User's browser. In particular, Consumers MAY process namespace rewriting by using a prefix that is unique to the user/entity pair provided any such prefix is held constant for the duration of the user's session with any one entity.

9.2.1.9 URL examples

Here are some examples of what 'URL's following this format:

- Load a resource "http://test.com/images/test.gif" - wsia:rewrite?wsia:urlType=Resource&wsia:url=http%3A%2F%2Ftest.com%2Fimages%2Ftest.gif/wsia:rewrite
- Declare this token as needing namespacing – wsia:rewrite?wsia:urlType=Namespace&wsia:token=myFunc/wsia:rewrite
- Declare a secure interaction back to the entity – wsia:rewrite?wsia:urlType=Action&wsia:secureURL=true&wsia:navigationalState=a8h4K5JD9&myParam=foobar/wsia:rewrite

- Request the Consumer render the entity in a different mode and window state – wsia:rewrite?wsia:urlType=Render&wsia:mode=HELP_MODE&wsia:windowState=VIEW_DETACHED/wsia:rewrite

9.2.2 Producer URL Writing

Entities often are willing to properly write URLs for the Consumer, as this decentralizes the preparation of the page for rendering and thereby may provide better page load performance to the End-User. At other times, entities choose to dynamically compute the URL in script on the End-User's machine just before activating the URL. To enable these functionalities, several templates are defined by which the Consumer indicates how it needs URLs formatted in order to process them properly. These all take the form of a simple template, namely:

```
http://www.Consumer.com/path?wsia:urlType={wsia:urlType}&…
```

The definition of the content of this template is completely up to the Consumer. It may consist of zero or more replacement tokens. These tokens are enclosed in curly braces (i.e. '{' and '}') and contain the name of the parameter that should be replaced. All content outside the {} pairs MUST be treated by the entity as constants the Consumer wishes to receive when the URL is activated. The list of defined parameter names matches those in section 9.2.1, with the addition of `wsia:requestParameters` and `wsia:refHandle`. These parameters define where the entity should place data items it needs in the `requestParameters` field of the `markupParams` data structure when the URL is activated, and a reference the Consumer MAY use to determine the target refined entity for an invocation. The value replacing `wsia:requestParameters` should follow the pattern of a URL query string (name/value pairs separated by the '&' character).

This specification defines a `Template` structure that is passed to **getMarkup()** supplying these values. Entities specifying `templatesStoredInSession` as 'true' enable the Consumer to only send these until the Producer returns a refined refHandle. The Consumer MUST supply these templates for entities specifying `doesUrlTemplatesProcessing` as 'true'. The following describe in more detail the usage of the fields from the `Template` structure.

9.2.2.1 ActionTemplate

Activation of the URL will result in an invocation of **performInteraction()**. The Consumer SHOULD integrate placeholders for the tokens `wsia:navigationalState`, `wsia:entityMode` and `wsia:windowState` in its template. The Consumer MUST apply changes in mode or state before invoking **performInteraction()**.

9.2.2.2 SecureActionTemplate

Equivalent to `wsia:ActionTemplate` using secure communications.

9.2.2.3 RenderTemplate

Activation of the URL will result in an invocation of **getMarkup()**. The Consumer SHOULD integrate placeholders for the tokens `wsia:navigationalState`, `wsia:entityMode` and `wsia:windowState` in its template. The Consumer MUST apply changes in mode or state before invoking **getMarkup()**.

9.2.2.4 SecureRenderTemplate

Equivalent to `wsia:RenderTemplate` using secure communications.

9.2.2.5 ResourceTemplate

Activation of the URL will result in the Consumer fetching the underlying resource, possibly in a cached manner, and returning it to the End-User. For the HTTP protocol this maps to a "get" on the underlying resource. The Consumer SHOULD integrate placeholders for the token `wsia:url` to allow the entity to place the address of the URL.

9.2.2.6 SecureResourceTemplate

Equivalent to `wsia:ResourceTemplate` using secure communications.

9.2.2.7 DefaultTemplate

A template whose value is to be used as the default value for any template whose value is not supplied. Consumers setting just this template value SHOULD also set a separate default for the secure communications templates using `wsia:SecureDefaultTemplate`, unless the default template already uses secure communications. The default value of this template is "wsia:rewrite?wsia:navigationalState={wsia:navigationalState}&wsia:urlType={wsia:urlType}&wsia:mode={wsia:mode}&wsia:windowState={wsia:windowState}&wsia:url={wsia:url}&wsia:token={wsia:token}&wsia:rewriteResource={wsia:rewriteResource}&wsia:refHandle={wsia:refHandle}&{wsia:`requestParameters`}/wsia:rewrite". It should be noted that this default value provides the correct syntax for the Consumer to then process the "URL" using the rules from section 9.2.1.

9.2.2.8 SecureDefaultTemplate

This template provides a value that overrides the one supplied for `wsia:DefaultTemplate` for those templates whose names begin with "wsia:Secure". The default value of this template is "wsia:rewrite?wsia:secureURL=true&wsia:navigationalState={wsia:navigationalState}&wsia:urlType={wsia:urlType}&wsia:mode={wsia:mode}&wsia:windowState={wsia:windowState}&wsia:url={wsia:url}&wsia:token={wsia:token}&wsia:rewriteResource={wsia:rewriteResource}}&wsia:refHandle={wsia:refHandle}&{wsia:`requestParameters`}/wsia:rewrite".

9.2.2.9 NamespacePrefix

The Producer can use the content of this property as a prefix for tokens that need to be unique on the aggregated page.

9.2.3 BNF-like Description of URL formats

ConsumerURL = BeginToken NameValuePairs EndToken

BeginToken = 'wsia:rewrite?'

EndToken = '/wsia:rewrite'

NameValuePairs = (NameValuePair ('&' NameValuePair)*

NameValuePair = (BaseNames '=' Value) | UrlTypePair | SecureUrlPair | RewriteResourcePair | EntityNameValuePair

BaseNames = 'wsia:navigationState' | 'wsia:mode' | 'wsia:windowState' | 'wsia:url' | 'wsia:token'

UrlTypePair = UrlTypeName '=' ('Action' | 'Render' | 'Resource' | 'NameSpace'

SecureUrlPair = SecureUrlName '=' BooleanValue

RewriteResourcePair = RewriteResourceName '=' BooleanValue

UrlTypeName = 'wsia:urlType'

SecureUrlName = 'wsia:secureUrl'

RewriteResourceName = 'wsia:rewriteResource'

BooleanValue = (‘true’ | ‘false’)

Value = Text

EntityNameValuePair = Text ‘=’ Text

ProducerURLTemplate = (Text* ReplacementToken*)*

Text = <any URL-encoded textual characters>

ReplacementToken = ‘{‘ ParameterName ‘}’

ParameterName = BaseNames | UrlTypeName | SecureUrlName | RewriteResourceName | ‘wsia:`requestParameters`’ | ‘wsia:refHandle’

9.3 Namespace Encoding

Aggregating multiple entities from different sources can potentially result in naming conflicts for various types of elements: named attributes, form fields, JavaScript functions and variables, etc. Such tokens must therefore be encoded to an entity-instance specific namespace [A301]. The entity does this by prefixing the name of the resource with a namespace prefix.

If namespace encoding is used for form parameters or other data the entity receives as in a **performInteraction()** or **getMarkup()** invocation, then the Consumer MUST strip the namespace prefix from the parameter names before passing them to the Producer. This means the entity logic can be agnostic regarding namespace issues except when encoding parameters in the markup.

Similar to the case of URL rewriting, two options exist to obtain a namespace prefix.

9.3.1 Consumer Rewriting

The entity uses the static, predefined method (section 9.2.1) to denote tokens that need a namespace prefix. The Consumer parses the markup fragment to locate these tokens and replace them with a namespaced token unique in the context of the page aggregation. This namespaced token MUST be the same for occurrences of a token in the set of documents being processed while building the aggregated page. This is done using the same method as URL rewriting and is described in that section. It is expected that the length this method adds to names might make it unwieldy to content authors, but the expectation that tooling/runtime support can alleviate most of this burden led to reusing this singular technique for the Consumer parsing/rewriting the markup.

9.3.2 Producer Writing

The entity uses a namespace provided by the Consumer to prefix these tokens in its markup. The Consumer ensures this prefix is unique for the page aggregation, so the Consumer is not required to process the markup. The Consumer supplies the prefix the entity needs to use via the `NamespacePrefix` field in the `Templates` structure.

9.3.3 General issues

9.4 Markup Fragment Rules

Because the Consumer aggregates the markup fragments produced by entities into a single page, some rules and limitations are needed to ensure the coherence of the resulting page to be displayed to the End-User. For efficiency reasons, Consumers are not required to validate the markup fragments returned by the entity. So in order to be aggregated, the entity MUST ensure its markup conforms to the following general guidelines [A300][A302].

The disallowed tags listed below are those tags that impact other entities or may even break the entire aggregated page. Inclusion of such a tag invalidates the whole markup fragment, which the Consumer MAY replace with an error message.

9.4.1 HTML

9.4.1.1 Disallowed Tags

Since the Consumer may implement its aggregation in many ways, including using frames, some Consumers may actually support these disallowed tags. However, in order to be certified as being a cross-platform entity, an entity MUST NOT use the following tags:

base
body
frame
frameset
head
html
title

9.4.1.2 Other Tags

There are some tags that are specifically prohibited by the HTML specification from occurring outside the <head> of the document. However, browser implementations offer varying levels of support. For example, current versions of Internet Explorer and Netscape Navigator both support the style tag anywhere within the document.

It is up to the entity developer to decide when using such tags is appropriate. Here is a list of tags that fit this description:

link
meta
style

9.4.2 XHTML

9.4.2.1 Disallowed Tags

base
body
head
html
title

9.4.2.2 Other Tags

link
meta
style

9.4.3 XHTML Basic

9.4.3.1 Disallowed Tags

base
body
head
html
title

9.4.3.2 Other Tags

link
meta
style

9.5 CSS Style Definitions

One of the goals of an aggregated page is a common look-and-feel across the entities contained on that page. This not only affects the decorations around the entities, but also their content. Using a common CSS style sheet for all entities, and defining a set of standard styles, provides this common look-and-feel without requiring the entities to generate Consumer-specific markup. Entities SHOULD use these style definitions in order to participate in a uniform display of their content by various Consumers.

This section defines styles for a variety of logical units in the markup.

9.5.1 Links (Anchor)

A custom CSS class is not defined for the <a> tag. The entity should use the default classes when embedding anchor tags.

9.5.2 Fonts

The font style definitions affect the font attributes only (i.e. font face, size, color, style, etc.).

Style	Description	Example
.wsia-font	Font attributes for the “normal” fragment font. Used for the display of non-accentuated information.	Normal Text
.wsia-font-dim	Font attributes similar to the .wsia.font but the color is lighter.	Dim Text

If an entity author wants a certain font type to be larger or smaller, they should indicate this using a relative size.

Example1: Important information

Example1: Small and dim

9.5.3 Messages

Message style definitions affect the rendering of a paragraph (i.e. alignment, borders, background color, etc.) as well as text attributes.

Style	Description	Example
.wsia-msg-status	Status of the current operation.	*Progress: 80%*
.wsia-msg-info	Help messages, general additional information, etc.	Info about
.wsia-msg-error	Error messages.	Portlet not available
.wsia-msg-alert	Warning messages.	*Timeout occurred, try again later*
.wsia-msg-success	Verification of the successful completion of a task.	**Operation completed successfully**

9.5.4 Sections

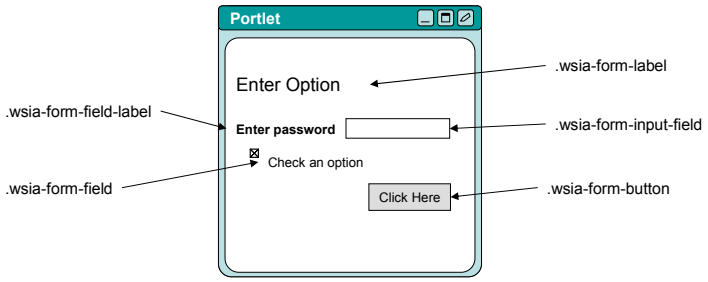
Section style definitions affect the rendering of markup sections such as table, div and span (i.e. alignment, borders, background color, etc.) as well as their text attributes.

Style	Description
wsia-section-header	Table or section header
.wsia-section-body	Normal text in a table cell
.wsia-section-alternate	Text in every other row in the cell
.wsia-section-selected	Text in a selected cell range
wsia-section-subheader	Text of a subheading
wsia-section-footer	Table or section footnote
wsia-section-text	Text that belongs to the table but does not fall in one of the other categories (e.g. explanatory or help text that is associated with the section).

9.5.5 Forms

5 Form styles define the look-and-feel of the elements in an HTML form.

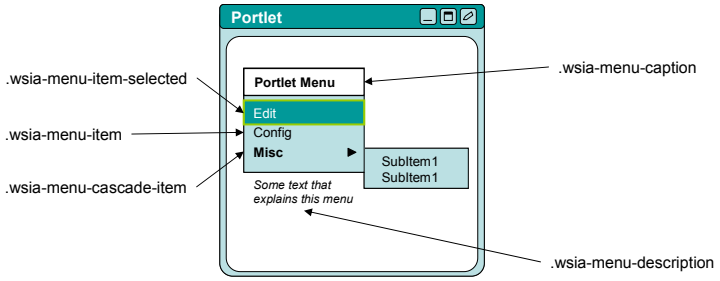
Style	Description
.wsia-form-label	Text used for the descriptive label of the whole form (not the labels for fields.
.wsia-form-input-field	Text of the user-input in an input field.
.wsia-form-button	Text on a button
.wsia-icon-label	Text that appears beside a context dependent action icon.
.wsia-dlg-icon-label	Text that appears beside a “standard” icon (e.g. Ok, or Cancel)
.wsia-form-field-label	Text for a separator of fields (e.g. checkboxes, etc.)
.wsia-form-field	Text for a field (not input field, e.g. checkboxes, etc)



9.5.6 Menus

Menu styles define the look-and-feel of the text and background of a menu structure. This structure may be embedded in the aggregated page or may appear as a context sensitive popup menu.

Style	Description
.wsia-menu	General menu settings such as background color, margins, etc
.wsia-menu-item	Normal, unselected menu item.
.wsia-menu-item-selected	Selected menu item.
.wsia-menu-item-hover	Normal, unselected menu item when the mouse hovers over it.
.wsia-menu-item-hover-selected	Selected menu item when the mouse hovers over it.
.wsia-menu-cascade-item	Normal, unselected menu item that has sub-menus.
.wsia-menu-cascade-item-selected	Selected sub-menu item that has sub-menus.
.wsia-menu-description	Descriptive text for the menu (e.g. in a help context below the menu)
.wsia-menu-caption	Menu caption



10 User Information

This specification provides a mechanism for entities to use End-User information as a means for personalizing behavior to the current user [A600][A606]. A standard set of user attributes has been derived from P3P User Data and is defined in Section 11. Extensibility is supported in both directions; the Consumer indicates to the Producer during registration what set of user profile extensions it supports, and an entity's metadata declares what user profile items it uses (including any extended user profile items). The following table maps the nested profile structures to profileNames:

Profile Name	Field Name	Structure 1	Structure 2
name/prefix	prefix	name	
name/given	given	name	
name/family	family	name	

name/middle	middle	name	
name/suffix	suffix	name	
name/nickName	nickName	name	
birthDate	birthDate		
gender	gender		
employerInfo/employer	employer	employerInfo	
employerInfo/department	department	employerInfo	
employerInfo/jobTitle	jobTitle	employerInfo	
homeInfo/address/name	name	homeInfo	address
homeInfo/address/street	street	homeInfo	address
homeInfo/address/city	city	homeInfo	address
homeInfo/address/stateprov	stateprov	homeInfo	address
homeInfo/address/country	country	homeInfo	address
homeInfo/address/org	org	homeInfo	address
homeInfo/telephone	telephone	homeInfo	
homeInfo/email	email	homeInfo	
homeInfo/online	online	homeInfo	
workInfo/address/name	name	workInfo	address
workInfo/address/street	Street	workInfo	address
workInfo/address/city	City	workInfo	address
workInfo/address/stateprov	stateprov	workInfo	address
workInfo/address/country	country	workInfo	address
workInfo/address/org	org	workInfo	address
workInfo/telephone	telephone	workInfo	
workInfo/email	email	workInfo	
workInfo/online	online	workInfo	

Entities that need access to user information MUST declare in its metadata the specific user profile fields it needs using the names specified above.

10.1 Passing User Information

5 User information MAY be passed to the Producer when a Consumer invokes certain operations. A Consumer SHOULD provide the specific fields the entity declared it needs, unless the information is not available or is restricted by policy (e.g. privacy policy).

10.2 User Identity

Mechanisms that support federation of user identity between web services systems are defined in other specifications, such as WS-Security and SAML. If a Consumer and Producer need to share a common identity for an End-User, it is recommended that compliance with these standards be the means to passing the required information.

It is anticipated that some entities will interact with one or more back-end applications that require a user identity for the End-User. If the user identity required by the back-end application is not the same as that authenticated or otherwise supplied by the Consumer, the entity SHOULD require the End-User to provide the necessary information (preferably using secure transport) for use with the back-end application via markup interactions (e.g. display a form that prompts for a user identity and any security tokens (such as a password) for the back-end system).

---

11 Data Structures

It is often necessary to pass data to operations. Wherever possible typed data object are defined as the transport mechanism for this data [A504][A505]. Extensibility elements are also provided for vendor or application-specific data extensions. Many of these data structures have been described in the sections describing the operations in which they are referenced here (with hyperlinks back to those explanations) in order to have all the structures defined in one place. This non-normative section uses an IDL like syntax for describing these structures for the convenience of the reader. The normative definitions for these structures are defined by the WSDL referenced in section 15.

Extensibility of all the data structures is defined using the schema syntax for including arbitrary content from other namespaces.

11.1 CacheControl Type

The `CacheControl` structure contains a set of fields needed for the entity to manage cached markup fragments. This data structure is defined in section 5.1.3.

11.2 ClientData Type

The `MarkupParam` structure types carries information concerning the user agent and client device using this type.

```
ClientData
    [R] String        userAgent
    [R] String        deviceInfo
    [O] Extension[]   extensions
```

Members:

- `userAgent`: String identifying the UserAgent of the End-User.
- `deviceInfo`: Type of device rendering the markup to the End-User. [RT: Is there a list somewhere we can point at for these values?]
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

11.3 EntityContext Type

The `EntityContext` structure is used as a parameter on many operations to supply the entity information that was pushed to the Consumer. This data structure is defined in section 5.1.2.

11.4 EntityDescription Type

The `EntityDescription` structure contains a set of fields that provide the metadata to describe the entity. This data structure is defined in section 7.1.1.

11.5 EntityResponse Type

The `EntityResponse` structure contains fields returned by the **cloneEntity()** operation. This data structure is defined in section 7.1.4.

11.6 Extension

The `Extension` structure contains the payload extension mechanism for vendor and application extensions. This data structure is defined in section 4.1.1.

11.7 Handle Types

Handles are opaque references that are passed between the Consumer and Producer.

Handles are represented as restricted strings in the protocol. Although a string is principally unlimited in length, the length of the handle is restricted for the following reasons:

- Handles may be stored in databases and may be used for indexing.
- The Consumer will likely embed handles in client URLs.
- Comparison of handles should be efficient.

The maximum handle size is restricted to 255 bytes. The Consumer MAY ignore any character in a handle that falls outside this range.

Handle **extends** String

11.8 InteractionParams Type

The `InteractionParams` structure contains fields specific to invoking the **performInteraction()** operation. This data structure is defined in section 5.1.8.

11.9 InteractionResponse Type

The `InteractionResponse` structure contains the various items **performInteraction()** can return. This data structure is defined in section 5.1.7.

11.10 LocaleData Type

The `LocaleData` structure contains a variety of entity description fields whose values typically should involve localization of the data values as well as the locale this particular set of values are for.

```
LocaleData
    [O] String        locale
    [O] String        description
    [O] String        shortTitle
    [O] String        title
    [O] String[]      keywords
    [O] Extension[]   extensions
```

Members:

- `locale`: The locale for this descriptive response.[4]
- `description`: Descriptions of the entity. This SHOULD be displayed on selection dialogs, etc.
- `shortTitle`: A short title for the entity.
- `titles`: Title for the entity.
- `keywords`: Array of keywords describing the entity which can be used for search, etc.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

11.11 MarkupParams Type

The `MarkupParams` structure contains a set of fields needed for the entity to generate markup that will enable the End-User to visualize the state of the entity. This data structure is defined in section 5.1.4.

11.12 MarkupResponse Type

The `MarkupResponse` structure contains fields for returning various items in response to a **getMarkup()** invocation. This data structure is defined in section 5.1.5.

11.13 Property Type

The `Property` data structure is used to carry typed information between the Consumer and Producer. The two primary uses are to expose the data model of an entity and for the Consumer to send typed data values to the Producer/entity for processing.

```
Property
    [R] String        name
    [O] String        value
    [O] boolean       reset
    [O] String[]      otherAttributes
```

Members:

- `name`: Name of the property, must not be null
- value: String representation of the property's value. The interpreter is responsible for serializing and deserializing the correct value type.
- reset: Boolean indicating the Consumer would like this Property reset to its default value.
- `otherAttributes`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace and are restricted to the string datatype.

[4] http://lcweb.loc.gov/standards/iso639-2/langcodes.html

11.14 PropertyDescription Type

The properties of an entity are described in its metadata using this structure. This data structure is defined in section 7.1.6.

11.15 PropertyList

A `PropertyList` gathers an array of Property structures together for transmitting between the Consumer and Producer. This data structure is defined in section 7.1.5.

11.16 RegistrationContext Type

The `RegistrationContext` structure contains fields related to a particular registration of a Consumer with a Producer. It is returned by the **register()** operation and is a required parameter on most other operations. This data structure is defined in section 4.1.5.

11.17 RegistrationState Type

The `RegistrationState` structure contains fields related to a particular registration of a Consumer with a Producer. It is returned by the **modifyRegistration()** operation and contains the fields of a `registrationContext` that allow a Producer to push the storage of state at registration scope to the Consumer. This data structure is defined in section 4.1.4.

11.18 RegistrationData Type

The `RegistrationData` structure provides the means for the Consumer to supply the data required for registration with a Producer as well as protocol extensions that it supports. This data structure is defined in section 6.1.1.

11.19 RoleDescription Type

This structure is used to describe the roles a Consumer MAY assert for an End-User when interacting with the entities at the Producer. The Consumer MUST NOT assert a role for which no `RoleDescription` was part of the Producer's `ServiceDescription`. Entities MUST NOT declare support for roles that are not part of the Producer's `ServiceDescription`. Note that roles are Producer-wide and therefore are inherently shared by entities.

```
RoleDescription
   [R] String       name
   [R] String       description
   [O] Extension[]  extensions
```

Members:

- `name`: The name for this role. Preferred form for this names is a URI such that it is definitively namespaced.
- `description`: A free form description of the role. Expected use of this field is display at the Consumer to someone who will provide a mapping to Consumer supported roles.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

11.20 ServiceDescription Type

The `ServiceDescription` structure contains a set of fields that describe the offered services of the Producer. This data structure is defined in section 4.1.1.

11.21 Templates Type

The `Templates` structure contains a set of fields that enable Producer URL writing. This data structure is defined in section 5.1.6.

11.22 UserContext Type

The `UserContext` structure supplies End-User specific data to operations. Note that this does not carry user authentication type information (e.g. userID / password) as quite flexible mechanisms for communicating this information are being defined elsewhere (e.g. WS-Security (see section 3.1.2) defines how to carry User Information in a SOAP header). This data structure is defined in section 4.1.3.

11.23 User Profile Types

The `UserProfile` structure is used to carry information about the End-User. The entity uses the `userProfileItems` in its metadata to describe the fields it uses to generate markup from this set and any others the Consumer indicated were available when it registered. See section 10 for a complete description of this portion of the protocol.

```
UserProfile
    [O] UserName       name
    [O] Date           birthdate
    [O] String         gender
    [O] EmployerInfo   employer
    [O] LocationInfo   homeInfo
    [O] LocationInfo   workInfo
    [O] Extension[]    extensions
```

Members:

- `name`: A structure containing the various fields for the End-User's name.
- `birthdate`: The End-User's birthdate.
- `gender`: The End-User's gender ('M' = male, 'F' = female).
- `employer`: A structure containing various fields for the End-User employer's information.
- `homeInfo`: The End-User's home location information.
- `workInfo`: The End-User's work location information.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

11.23.1 UserName Type

The `UserName` structure carries the detailed fields for the parts of an End-User's name.

```
UserName
    [O] String         prefix
    [O] String         given
    [O] String         family
    [O] String         middle
    [O] String         suffix
    [O] String         nickName
    [O] Extension[]    extensions
```

Members:

- `prefix`: Examples include Mr, Mrs, Ms, Dr, etc.
- `given`: The End-User's first or given name.
- `family`: The End-User's last or family name.
- `middle`: The End-User's middle name(s) or initial(s).
- `suffix`: Examples include Sr, Jr, III, etc.
- `nickName`: The End-User's preferred nick name.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

11.23.2 EmployerInfo Type

The `EmployerInfo` structure contains the detailed fields concerning the End-User's employer.

```
Employerinfo
    [O] String       employer
    [O] String       department
    [O] String       jobTitle
    [O] Extension[]  extensions
```

Members:

- `employer`: The name of the employer.
- `department`: The name of the department the End-User works within.
- `jobTitle`: The title of the End-User's job.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

11.23.3 LocationInfo Type

The `LocationInfo` structure is used to describe a location for the End-User.

```
LocationInfo
    [O] Address      address
    [O] String[]     telephone
    [O] String[]     email
    [O] String[]     online
    [O] Extension[]  extensions
```

Members:

- `address`: A structure for various fields holding portions of the postal address.
- `telephone`: An array of telephone numbers for the End-User.
- `email`: An array of email addresses for the End-User.
- `online`: An array of URIs for the End-User (usually web-sites).
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

11.23.4 Address Type

The `Address` structure carries the detailed fields describing a particular address.

```
Address
    [O] String       name
    [O] String[]     street
```

```
[O] String       city
[O] String       stateprov
[O] String       country
[O] String       org
[O] Extension[]  extensions
```

Members:

- `name`: The name to which items should be addressed.
- `street`: The street portion of the addess. This may involve multiple lines of an address.
- `city`: The city portion of the address.
- `stateprov`: The state or province portion of the address.
- `country`: The country portion of the address.
- `org`: Any organization needing to be specified in the address.
- `extensions`: A mechanism implementations MAY choose to use for extending this structure provided those extensions come from a different namespace.

12 Producer Roles

Administrator	This role typically grants the highest level of access to the functionality of an entity.
User	This role is typically associated with End-Users who may personalize some set of properties for an entity.
Guest	This role is typically associated with End-Users who may view an entity on a page but not modify any of its properties or settings.

13 Constants

Type	Value	Description
Mode	VIEW_MODE	Entity is expected to render markup reflecting its current state.
Mode	EDIT_MODE	Entity is expected to render markup useful for End-User personalization.
Mode	CONFIG_MODE	Entity is expected to render markup useful for setting its configuration.
Mode	HELP_MODE	Entity is expected to render markup useful for helping an End-User understand the entity's operation.
Mode	PREVIEW_MODE	Entity is expected to render markup representative of its configuration, as this might be useful to someone testing a page layout.
Window state	VIEW_NORMAL	The entity is sharing space with other entities and should restrict its consumption of space accordingly.
Window state	VIEW_MINIMIZED	The entity, though still aggregated on the page, is expected to restrict its consumption of space to a bare minimum.
Window state	VIEW_MAXIMIZED	The entity is being offered significantly more that the normal share of the space available to entities on the Consumer's aggregated page.
Window state	VIEW_DETACHED	The entity's markup will be detached in a separate window (could be just a virtual window) from any other entity's markup.
Cache Hint	CACHE_USER	The returned markup depends on the `userContext` such that any change to the `userContext` MUST invalidate any Consumer caching of the markup.
Cache Hint	CACHE_REGISTRATION	The returned markup depends on the `registrationContext` such that any change to the `registrationContext` MUST invalidate any Consumer caching of the markup.
Cache Hint	CACHE_MARKUP_PARAMS	The returned markup depends on the `markupParams` such that any change to the `markupParams` MUST invalidate any Consumer caching of the markup.

14 Fault Messages

In addition to generic fault messages that may be generated by the web service stacks of the Consumer and/or Producer, a variety of messages specific to this protocol are defined. WSDL defines fault codes to be strings using '.' as a delimiter to scope the error codes. The following are defined for constructing a WSRP/WSIA error code (e.g. "WSRP.Security.AccessDenied" is a defined error code):

Top Level	Category Level	Specific Code	Description
WSRP	Security	AccessDenied	Policy has denied access either to the End-User, the asserted `producerRole` or the consumer's registration.
WSRP	Security	InvalidProducerRole	The specified `producerRole` is not supported.
WSRP	Security	InconsistentParameters	Used when a Consumer supplies an `entityHandle` that is not scoped by the supplied `registrationHandle`.
WSRP	Security	InvalidRegistration	Used when a Consumer supplies a `registrationHandle/registrationState` pair that are not recognized by the Producer.
WSRP	Security	AuthenticationFailure	The credentials supplied were not able to be authenticated by the Producer.
WSRP	Security		
WSRP	Security		
WSRP	Interface	MissingParameters	Used when required parameters are missing.
WSRP	Interface	OperationFailed	Normal execution of the operation failed. Check the detailed message for reasons why.
WSRP	Interface	InvalidHandle	Used when the Consumer supplies an invalid `entityHandle` or `refHandle`
WSRP	Interface	EntityStateChangeRequired	Used when an entity needs to modify its persistent state, but has been prevented from doing so by the Consumer setting `entityStateChange` to 'Fault'.
WSRP	Interface	InvalidEnvironment	Used only when the environment at the Producer has timed out AND the Producer needs the Consumer to invoke **initEnvironment()** again.
WSRP	Interface	UnsupportedMode	The entity does not support generating markup for the requested mode.
WSRP	Interface	UnsupportedWindowState	The entity does not support generating

			markup for the requested window state.
WSRP	Interface	UnsupportedLocale	The entity does not support generating markup for the requested `locale`.
WSRP	Interface	UnsupportedMarkupType	The entity does not support generating markup for the requested `markupType`.
WSRP	Interface	NoCloneGenerated	The invocation of **cloneEntity()** did not produce a new entity.
WSRP	Interface		
WSRP	Interface		
WSRP	Interface		

15 WSDL Interface Definition

The WSDL that MUST be referenced by Producers implementing this specification are located at:

http://www.oasis-open.org/committees/wsrp/wsdl/v1/WSRP-v1-Interfaces.wsdl - Contains the messages and portType definitions for this specification.

http://www.oasis-open.org/committees/wsrp/wsdl/v1/WSRP-v1-Bindings.wsdl - Contains the standard binding definitions for this specification.

This WSDL defines the following portTypes:

1. WSRP.v1.Markup.PortType: All Producers MUST expose this portType.
2. WSRP.v1.ServiceDescription.PortType: All Producers MUST expose this portType.
3. WSRP.v1.Registration.PortType: Only Producers supporting in-band registration of Consumers need expose this portType.
4. WSRP.v1.EntityManagement.PortType: Producers supporting the entity management interface expose this portType. If this portType is not exposed, the entities of the service are not configurable by Consumers.

16 References

16.1 Normative

[RFC2119] *S. Bradner,* Key words for use in RFCs to Indicate Requirement Levels*, http://www.ietf.org/rfc/rfc2119.txt, IETF RFC 2119, March 1997.*

16.2 Non-Normative

[J2EE] *http://java.sun.com/j2ee/*

[.Net] *http://www.microsoft.com/net/*

[WSDL] *http://www.w3.org/TR/wsdl*

[SOAP] *http://www.w3.org/TR/SOAP/*

[UDDI] *http://www.uddi.org/specification.html*

[WSIL] *http://www-106.ibm.com/developerworks/webservices/library/ws-wsilspec.html*

[WSRP Whitepaper] *Thomas Schaeck,* Web Services for Remote Portals (WSRP) Whitepaper*, http://www.oasis-open.org/committees/wsrp/documents/wsrp_wp_09_22_2002.pdf, 22 September, 2002.*

[Requirements] *http://www.oasis-open.org/committees/wsia/documents/Requirements2002-09-17.html*

Appendix A. Glossary

Access	1. To interact with a system entity in order to manipulate, use, gain knowledge of, and/or obtain a representation of some or all of a system entity's resources. [1] 2. in the system domain, what an End user does to a Web site using a browser, or what a Client does to a Web service; 3. in the business domain, what a Consumer does to a Web service or a Web site hosted by a Producer;
Access Control	Protection of resources against unauthorized access; a process by which use of resources is regulated according to a security policy and is permitted by only authorized system entities according to that policy.
Access Rights	A description of the type of authorized interactions a subject can have with a resource. Examples include read, write, execute, add, modify, and delete.
Account	The set of attributes that together define a user's access to a given service. Each service may define a unique set of attributes to define an account. An account defines user or system access to a resource or service. A means of supporting a hierarchy of adaptations or properties related to portlet invocation for the consuming portal
Action	A notification that your state has changed.
Administrator	A person who installs or maintains a system (for example, a SAML-based security system) or who uses it to manage system entities, users, and/or content (as opposed to application purposes; see also End User). An administrator is typically affiliated with a particular administrative domain and may be affiliated with more than one administrative domain.
Anonymity	The quality or state of being anonymous, which is the condition of having a name or identity that is unknown or concealed. [1]
Attribute Also see 'Service Attribute'	A distinct characteristic of an object. An object's attributes are said to describe the object. Objects' attributes are often specified in terms of their physical traits, such as size, shape, weight, and color, etc., for real-world objects. Objects in cyberspace might have attributes describing size, type of encoding, network address, etc. Salient attributes of an object is decided by the beholder.
Authentication	To confirm a system entity's asserted principal identity with a specified, or understood, level of confidence.
Authorization	The process of determining, by evaluating applicable access control information, whether a subject is allowed to have the specified types of access to a particular resource. Usually, authorization is in the context of authentication. Once a subject is authenticated, it may be authorized to perform different types of access.

Browser	A system entity that is used by an end user to access a Web site. A browser provides a run-time environment for distributed application components on the client's device.
Client	a system entity (not a business entity) that accesses a Web service. Contrast with Browser and Customer.
Company	Any organizational entity
Consumer	A business entity that accesses a Web service or a Web site. Contrast with End user and Customer A business entity creating Consumer Applications
Consumer Application	A web application that uses one or more WSIA Web Services
Credential	Data that is transferred to establish a claimed principal identity. [4]
Customer	A business entity that purchases goods or services
End-User	1. A natural person who makes use of resources for application purposes (as opposed to system management purposes; see Administrator, User). [4] 2. A person who uses a device specific Browser to access a Web site
Event	A notification that some state in the system (that you are interested in) has changed
Host (verb)	to run an application on an execution platform, which typically consists of hardware and software
Fragment	A piece of markup that is not part of a full document - part of aggregate - not binary, but not necessarily XML - generally a markup language - can aggregate a bunch of fragments
Identity	The unique identifier for a person, organization, resource, or service.
Login, Logon, Sign-On	The process whereby a user presents credentials to an authentication authority, establishes a simple session, and optionally establishes a rich session.
Logout, Logoff, Sign-Off	The process of presenting credentials to an authentication authority, establishing a simple session, and optionally establishing a rich session.
Party	Refers to any person who interacts with the system and/or the network the system is managing.
Portal Application	Component that is the controlling application and is responsible for aggregating portlet content and displaying the portal page
Portal Modes	View, edit, help config, is under debate

Portal Page	Complete document rendered by a portal
Portlet	Component that generates fragment
Portlet Application	The equivalent of the WAR file
Portlet Class	Implementation of portlet as a Java class (compiled code)
Portlet Container	Environment where portlets run (lifecycle, security)
Portlet Content	What the portlet renders without controls that decorate it (fragment that the portlet creates)
Portlet Instance	Portlet object with given user configuration; essentially the handle
Portlet Object	Instance of portlet class (no defined portal state)
Portlet Window	Portlet has a set of controls that decorate it
Portlet Window Instance	Instantiation of a portlet on a page in a portlet window
Principal	A system entity whose identity can be authenticated.
Producer	A business entity that hosts a Web service or a Web site One or more WSIA web services A business entity creating, publishing and supporting WSIA Web Services
Provider	A business entity that sells access to or use of Web services
Pull	To actively request information from a system entity.
Push	To provide information to a system entity that did not actively request it.
Role	The combination of access rights available to a particular actor.
Service	1. A specific type of resource that is not physically obtained by a user, but is accessed periodically by the user. [4] 2. See Web Service
Service Attribute	Characteristics or qualifiers of a service – which describe details like type of encoding, network address, mailbox size for email, storage space for backup, and so on.
Service Offer	The unique combination of service attributes and service options that is provisioned to an identity
Service Option	The choices available within a service – which could be custom configured by the service provider as opposed to a service attribute which is inherent to the service. For example, a Gold Option and a Silver Option – which have to be part of the provisioning data.
Service Provider	The organizational entity that provides the service
Session	A lasting interaction between system entities, often involving a user, typified by the maintenance of some state of the interaction for the duration of the interaction.

Site	An informal term for an administrative domain in geographical or DNS name sense. It may refer to a particular geographical or topological portion of an administrative domain, or it may encompass multiple administrative domains, as may be the case at an ASP site. one portal-specific example of an administrative domain, user group, etc.
System / System Entity	An active element of a computer/network system. For example, an automated process or set of processes, a subsystem, a person or group of persons that incorporates a distinct set of functionality.
Time-Out	A period of time after which some condition becomes true if some event has not occurred. For example, a session that is terminated because its state has been inactive for a specified period of time is said to “time out”.
Uniform Resource Locator (URL)	Defined as “a compact string representation for a resource available via the Internet.” URLs are a subset of URI.
User	A natural person who makes use of a system and its resources for any purpose. See also administrator, end user. A natural person who makes use of a system and its resources for any purpose. See also end user.
Username/User Identity	The unique identity for a user with a system
Web Service	A Web Service is a software component that is described via WSDL and is capable of being accessed via standard network protocols such as but not limited to SOAP over HTTP.
WSIA Web Service	A SOAP-compliant Web Service that adheres to noe of more WSIA interfaces.
Web Site	A hosted application that can be accessed by an End user using a browser
Window States	Max, min, normal, detached
WSIA Interface	A programmatic interface defined by the WSIA committee to support the creation of Web Services that encapsulate and integrate user-facing interactive applications.
WSRP Service	Presentation oriented, interactive web services that can be aggregated by consuming applications - WSRP services can be published, found, and bound in a standard manner, describing themselves with standardized metadata
XML (Extensible Markup Language)	Extensible Markup Language, abbreviated XML, describes a class of data objects called XML documents and partially describes the behavior of computer programs which process them. XML is an application profile or restricted form of SGML, the Standard Generalized Markup Language [ISO 8879]
XML Namespace	A collection of names, identified by a URI reference, which are used in XML documents as element types and attribute names. An XML

	namespace is often associated with an XML schema. For example, SAML defines two schemas, and each has a unique XML namespace.

Appendix B. Acknowledgments

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- Alejandro Abdelnur, Sun
- Olin Atkinson, Novell
- Sasha Aickin, Plumtree
- Jeff Broberg, Novell
- Chris Brown, Novell
- Mark Cassidy, Netegrity
- Richard Cieply, IBM
- Dave Clegg, Sybase
- Ugo Corda, SeeBeyond
- William Cox, BEA
- Michael C. Daconta, McDonald Bradley
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- Brian Dirking, Stellent
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- Andreas Kuehne
- Aditi Karandika, France Telecom
- Alan Kropp, Epicentric
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Appendix C. Revision History

Rev	Date	By Whom	What
0.1	6/03/2002	Rich Thompson	Initial Draft
0.1.1	6/04/2002	Carsten Leue	Worked in some additional WSRP requirements
	6/05/2002	Rich Thompson	Added exemplary section to overview
	6/06/2002	Carsten Leue	Added request data to getFragment and invokeAction
0.1.2	6/06/2002	Rich Thompson	Added cloneEntities() & descriptive text
0.2	7/09/2002	Alan Kropp, Rich Thompson	Modified as per face-2-face discussions
0.21	7/10/2002	Rich Thompson	Refactored data objects
0.22	7/19/2002	Rich Thompson	Reflect discussion on email list
0.23	7/25/2002	Carsten Leue Rich Thompson	Added WSDL and included some explanations Reformat style Reflect discussion
0.3	8/01/2002	Rich Thompson	Migrate to OASIS spec template Reflect email list and concall discussions
0.31	8/08/2002	Rich Thompson Alan Kropp Chris Braun	Reflect discussion Fill out more of spec template Markup section Environment initialization section
0.32	8/10/2002	Rich Thompson Carsten Leue Chris Braun	Incorporated misc. comments/discussion Introduction section and explanation of sections Updated Markup section
0.4	8/16/2002	Rich Thompson Thomas Schaeck Alan Kropp	Rewrote Markup section, reflect discussion WSRP Use cases Cross references to requirements
0.5	8/30/2002	Rich Thompson Carsten Leue Mark Cassidy	Incorporated misc. comments/discussion UDDI, Additional data structure factoring Updated Security section
0.7	9/27/2002	Rich Thompson Carsten Leue Alan Kropp Charlie Wiecha	Reflect F2F discussion/decisions Rewrite Intro Propose caching support Propose Properties support
0.8	10/22/2002	Rich Thompson Carsten Leue Alan Kropp	

Appendix D. Notices

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