Liberty ID-WSF Web Services Framework Overview

Version: 1.0

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Abstract:

This is a *non-normative* document intended to provide an overview of the relevant features of the Liberty ID-WSF Version 1.0 Specifications. It provides a general introduction to the Liberty ID-WSF framework, and to how it fits with the other layers of the Liberty architecture. The reader is assumed to have some familiarity with SOAP 1.1, WS-Security, SAML, XML, and basic concepts such as namespaces and URIs.

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1. Introduction

1.1. About this document

The Internet is now a prime vehicle for personal, business and community interactions. The Liberty Identity Federation Framework (ID-FF) proposed the use of federated network identity to solve the problems of network identity. The Liberty Identity Web Services Framework (ID-WSF) builds upon this foundation and provides a framework for identity-based web services in a federated network identity environment.

This document is a *non-normative* overview intended to describe principal features of the Liberty ID-WSF Version 1.0 Specifications. It provides a general introduction to the Liberty ID-WSF framework, and describes where it fits with the other layers of the Liberty architecture, as well as with other relevant technologies for authentication.

Further details of the Liberty ID-WSF may be found in the following normative technical specification documents: ID-WSF Discovery Service, ID-WSF SOAP Binding, ID-WSF Security Mechanisms, ID-WSF Interaction Service, ID-WSF Client Profiles, ID-WSF Static Conformance Requirements, and ID-WSF Data Services Template. Definitions for abbreviations and acronyms not immediately defined in this document may be found in the Liberty Technical Glossary documents for Liberty ID-FF and Liberty ID-WSF [LibertyGlossary]. As this overview is non-normative it does not use terminology "MUST", "MAY", "SHOULD" in a manner consistent with [RFC2119].

The goal of this overview is to provide sufficient information for the readers to understand the architecture defined by the ID-WSF framework and the basic usage scenarios defined for use within the framework. The overview also highlights how the ID-WSF interacts with an identity management framework (such as Liberty ID-FF).

The audience for this document is technical managers and application developers. The reader is assumed to have some familiarity with SOAP 1.1 ([SOAPv1.1]), WS-Security ([wss-sms]), SAML ([SAMLCore11])and basic concepts such as namespaces and URIs. The ID-WSF specifications draw upon work conducted in Oasis, W3C and IETF. Standards referenced in a normative manner include SAML, WS-Security, HTTP, WSDL 1.1 ([WSDLv1.1]), XML ([XML]), SOAP 1.1, XML-Encryption ([xmlenc-core]), XML-Signature ([XMLDsig]), TLS 1.0 ([RFC2246]) or SSL 3.0 ([SSL]), and WAP.

1.2. What is the Liberty Alliance

The Liberty Alliance Project represents a broad spectrum of industries united to drive a new level of trust, commerce and communications on the Internet.

1.2.1. The Liberty Vision

The members of the Liberty Alliance envision a networked world across which individuals and businesses can engage in virtually any transaction without compromising the privacy and security of vital identity information.

1.2.2. The Liberty Mission

To accomplish its vision, the Liberty Alliance will establish open technical specifications that support a broad range of network identity-based interactions and provide businesses with:

- A basis for new revenue opportunities that economically leverage their relationships with consumers and business partners and
- A framework within which the businesses can provide consumers with choice, convenience, and control when using any device connected to the Internet.

1.3. What is Network Identity?

When users interact with services on the Internet, they often tailor the services in some way for their personal use. For example, a user may establish an account with a username and password and/or set some preferences for what information the user wants displayed and how the user wants it displayed. The network identity of each user is the overall global set of these attributes constituting the various accounts.

Today, users' accounts are scattered across isolated Internet sites. Thus the notion that a user could have a cohesive, tangible network identity is not realized.

1.3.1. The Liberty Objectives

The key objectives of the Liberty Alliance are to

- Enable consumers to protect the privacy and security of their network identity information
- Enable businesses to maintain and manage their customer relationships without third-party participation
- Provide an open single sign-on standard that includes decentralized authentication and authorization from multiple providers
- Create a network identity infrastructure that supports all current and emerging network access devices

These capabilities can be achieved when, first, businesses affiliate together into circles of trust based on Liberty-enabled technology and on operational agreements that define trust relationships between the businesses and, second, users federate the otherwise isolated accounts they have with these businesses (known as their local identities). In other words, a circle of trust is a federation of service providers and identity providers that have business relationships based on Liberty architecture and operational agreements. Note: Operational agreement definitions are out of the scope of the Liberty ID-FF Version 1.2 specifications. See Figure 1.

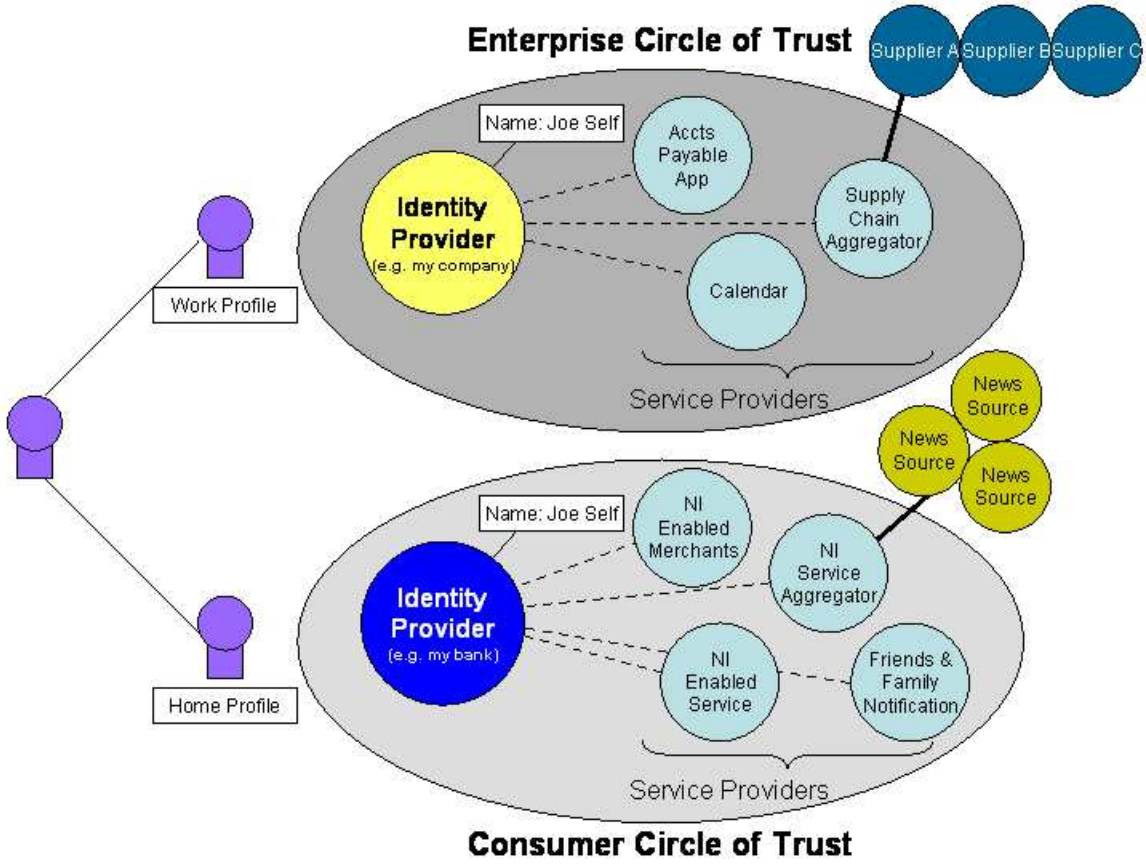

Figure 1. Federated Network Identity and Circles of Trust

From a Liberty perspective, the salient actors in Figure 2 are the user, service providers, and identity providers. Service providers are organizations offering Web-based services to users. This broad category includes practically any organization on the Web today, for example, Internet portals, retailers, transportation providers, financial institutions, entertainment companies, not-for-profit organizations, governmental agencies, etc.

Identity providers are service providers offering business incentives so that other service providers affiliate with them. Establishing such relationships creates the circles of trust shown in Figure 1. For example, in the enterprise circle of trust, the identity provider is a company leveraging employee network identities across the enterprise. Another example is the consumer circle of trust, where the user's bank has established business relationships with various other service providers allowing the user to wield his/her bank-based network identity with them. Note: A single organization may be both an identity provider and a service provider, either generally or for a given interaction.

Service providers and identity providers enable these scenarios by deploying Liberty-enabled products in their infrastructure, but do not require users to use anything other than today's common Web browser.

1.4. What is the Identity Services Framework?

The Liberty Identity Services Framework defines a SOAP based invocation framework with a layered architecture. The framework does not specify any contents for the SOAP body, allowing the development of identity services within the context of the Liberty Identity Web Services Framework. The layering is schematically depicted below.

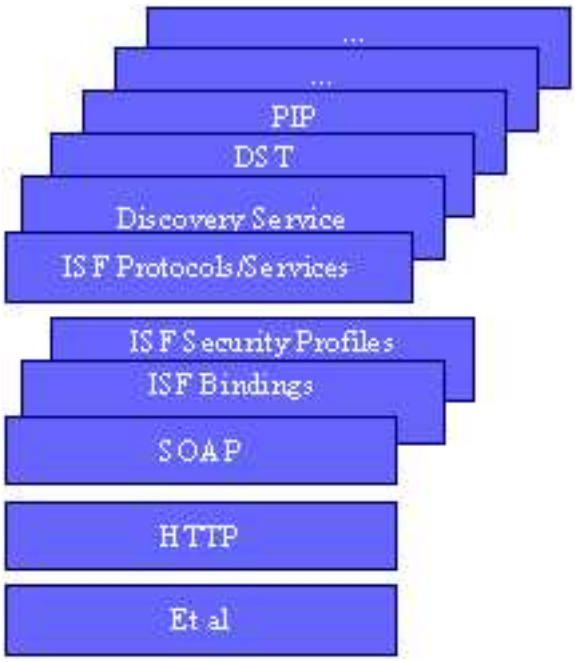

Figure 2. Liberty ID-WSF Protocol Architecture

1.5. Synopsis of Specifications

1.5.1. ID-WSF SOAP Binding (ID-WSF/Normative)

The ID-WSF SOAP Binding provides a SOAP-based invocation framework for identity services. It defines SOAP Header blocks and processing rules enabling the invocation of identity services via SOAP requests and responses. Additionally, a usage directive container is defined for those implementations that wish to use an existing rights expression language to specify the required service and data usage policies ([LibertySOAPBinding]).

1.5.2. ID-WSF Security Mechanisms (ID-WSF/Normative)

This specification describes profiles and requirements for securing the discovery and use of identity services. It includes security requirements to both protect privacy, and to ensure integrity and confidentiality of messages between service providers ([LibertySecMech]).

1.5.3. ID-WSF Discovery Service (ID-WSF/Normative)

Defines a core identity service that enables various entities (e.g., service providers) to dynamically discover a Principal's registered identity services. Given the type of service desired (e. g., Personal Profile Service[LibertyIDPP]), the Discovery Service responds with a service description containing WSDL for the desired identity service, provided that permissions set by the Principal allow the disclosure of these resources to the relevant entity. The Discovery Service can also function as a security token service, issuing security tokens to the requester that the requester will use in the request to the discovered identity service ([LibertyDisco]).

1.5.4. ID-WSF Data Services Template (ID-WSF/Normative)

Provides the building blocks when implementing a data service (e.g. Personal Profile Service) on top of the Identity Services Framework. The specification defines how to query and modify data stored in a data service and provides some common attributes for data services ([LibertyDST]).

1.5.5. ID-WSF Interaction Service (ID-WSF/Normative)

An identity service may need to obtain permission from a user (or someone who owns a resource on behalf of that user) to allow them to share data with requesting services. The interaction service specification details protocols and profiles for interactions that allow services to carry out such actions ([LibertyInteract]).

1.5.6. ID-WSF Profiles for Liberty-enabled User Agents or Devices (ID-WSF/Normative/Draft)

Describes the profiles and requirements for Liberty-enabled clients interacting with the SOAP based authentication service. A user agent or device that has specific support for one or more profiles of the Liberty specifications. It should be noted that although a standard web browser can be used in many Liberty-specified scenarios, it does not provide specific support for the Liberty protocols, and thus is not a Liberty-enabled User Agent or Device (LUAD). No particular claims of specific functionality should be implied about a system entity solely based on its definition as a LUAD. Rather, a LUAD may perform one or more Liberty system entity roles as defined by the Liberty specifications it implements. For example, a LUAD-LECP is a user agent or device that supports the Liberty LECP profile ([LibertyBindProf]), and a LUAD-DS would define a user agent or device offering a Liberty ID-WSF Discovery Service.

1.5.7. Metadata (ID-FF/ID-WSF Independent)

With this release, schema and protocols are introduced to facilitate real-time requests for metadata (previously assumed to be an out-of-band transfer). This will allow more spontaneous conversations between Liberty-compliant entities. A mechanism is defined for publishing the metadata. Several mechanisms for retrieving the metadata are defined (DNS, well known location). The metadata architecture is designed to be flexible going forward ([LibertyMetadata]).

Functionally, there are three primary classes of metadata:

- **entity core metadata**, which covers the metadata elements introduced in release 1 of the protocol with additional elements introduced in this release. Core metadata includes information about cryptographic keys used by entities, SOAP related information for service endpoints, as well as identity/service provider specific information and other service related information.

- **entity trust metadata**, which enables entities to cast business decisions based on the characteristic trust information provided in this class. This is not defined within the Alliance, but the metadata architecture could be used to publish or retrieve this data.

- **origin and document verification** through signature use in (server authenticated) HTTPS retrieval of the instance documents, DNS signatures, and document level signatures

1.5.8. Reverse HTTP Binding (ID-FF/ID-WSF Independent)

Enables a normal HTTP-based user-agent to receive SOAP requests inside an HTTP response. This allows end users to host identity services on their devices without running an HTTP server or being IP addressable from the Internet ([LibertyPAOS]).

1.5.9. SOAP Authentication Service (ID-FF/ID-WSF Independent)

Defines how to authenticate parties who are communicating via SOAP-based messages. It leverages widely used authentication services and mechanisms, and facilitates selection of these services and mechanisms at deployment time. This specification also defines an identity-based authentication security token service, complementing the more general security token service defined by the ID-WSF Discovery Service ([LibertyAuthn]).

2. ID-WSF User Experience Example

This section provides a simple, plausible example of the Liberty ID-WSF user experience, from the perspective of the user, to set the overall context for additional technical details of the Liberty. As such, actual technical details are hidden or simplified.

Note: The user experience examples presented in this section are non-normative and are presented for illustrative purposes only.

These user experience examples are based upon the following set of actors:

- Joe Self: A user of Web-based online services.
- Company XYZ: Joe self's employer. Joe Self is a Vice President for XYZ in charge of buying widgets. When Joe is in the office, Company XYZ acts as his identity provider.
- Company ABC: A Vendor of widgets that works closely with Company XYZ.
- Mobile IdP AntarctiCom: A Mobile Operator who acts as identity provider for Joe Self when not in the office.

The Liberty ID-WSF user experience assumes two things:

- Identity federation has occurred for Joe Self's accounts at Company XYZ and Company ABC. At Company ABC there are access policies that recognize Joe Self as an Employee of Company XYZ who is authorized to purchase widgets.
- Identity federation has occurred for Joe Self's accounts between Company XYZ and AntarctiCom. Business agreements have been signed between Company XYZ and AntarctiCom such that AntarctiCom may authenticate Company XYZ's users, and that Company XYZ may chain these assertions when interacting with their own partners.

2.1. Usage Examples with Mobile IdP

Joe Self is on the road at a big conference. He is presenting on widgets and their importance to Company XYZ's businesses. After his big presentation, he decides to access his corporate web portal with his browser in order to check his e-mail. He turns on his Mobile Data device, say a GSM phone with GPRS capability, and the Mobile IdP, AntarctiCom, authenticates his device.

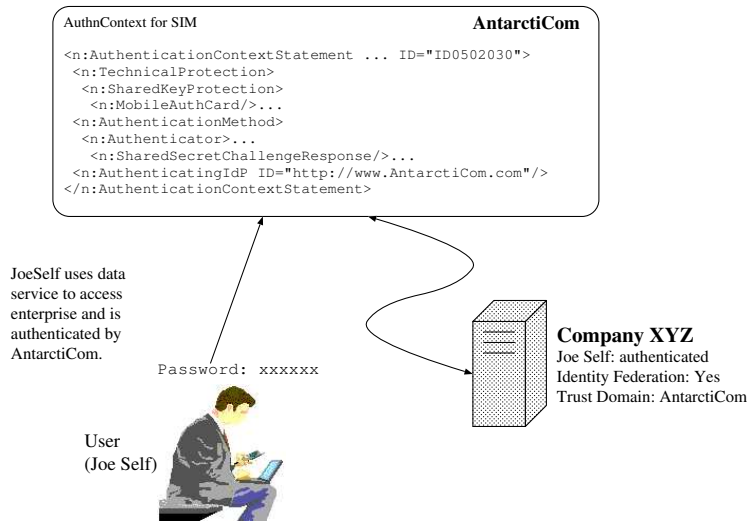

Figure 3. Joe Self Authenticated by AntarctiCom, Navigates to XYZ Portal

Joe Self finds out that XYZ has won a big order. They will need to buy widgets to make their products. Joe Self navigates to Company ABC's portal to check widget prices. Company ABC is a prime supplier to Company XYZ, so if the prices are fair Joe Self will buy from them. CompanyABC and CompanyXYZ have set up contracts and installed infrastructure in order to allow federation of accounts between their trust domains. Unfortunately Company ABC does not recognize AntarctiCom as an identity provider. XYZ and AntarctiCom have business agreements such that they can chain authentication though.

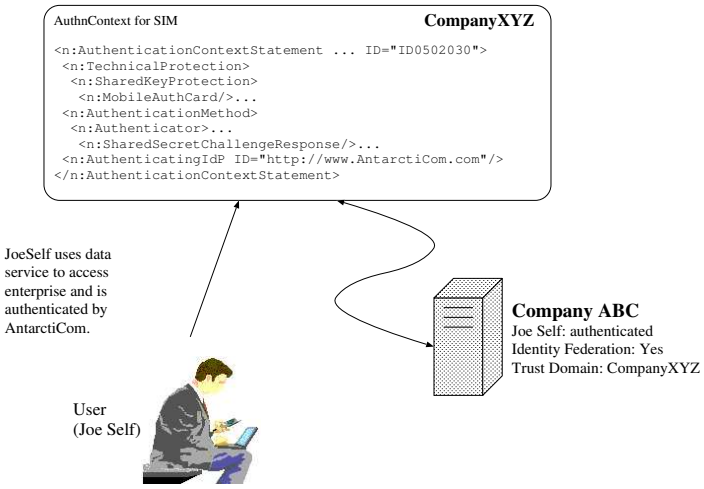

Figure 4. Joe Self Navigates to Company ABC, uses XYZ as Identity Provider

Joe checks the prices of widgets. They look good. He would like to buy. ABC has access control policies that require the use of a one time password in addition to the identity providers SIM based Authentication for that level of transaction. Joe provides the password and the order is processed. Joe decides that he better just change his flight home so that he can be in the office to discuss the order with his staff. Unfortunately the flight is full. Joe navigates to another airline but notices that his personal information is not up to date. The airline was able to discover Joe's Personal Profile during his sign-on at the site. He clicks on a button on the web page to update his profile at the airline.

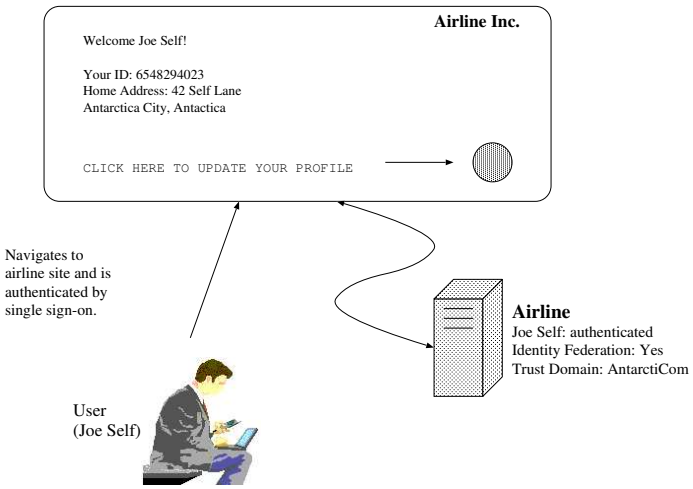

Figure 5. Joe Self Navigates to Airline site, uses AntarctiCom as Identity Provider

Joe Self has set his permissions at AntarctiCom such that he wants to be asked for permission prior to Personal Profile attributes being released to service providers. AntarctiCom uses the Liberty Interaction Service to query Joe Self for permission to release certain Personal Profile attributes.

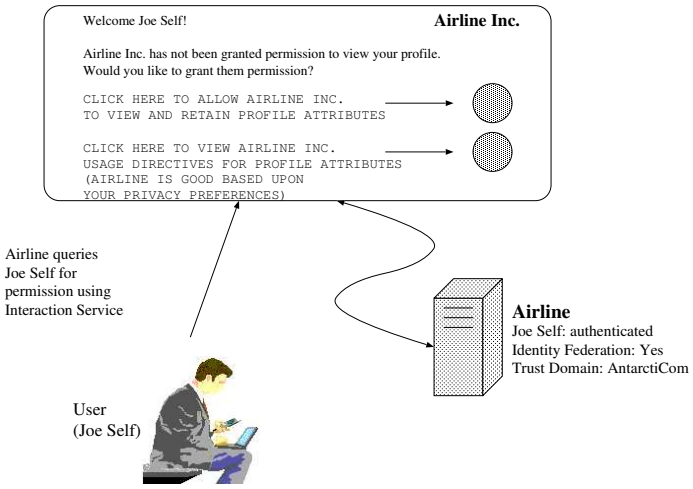

Figure 6. Airline uses Interaction Service to get permission to invoke Joe Self's Personal Profile

Joe Self has is leaving Antarctica next week, and he is not sure that AntarctiCom will have data services in the visited network. He decides to set up his own Personal Profile Service on the mobile device that he is using. Upon arriving in the North Pole, he sets permissions on his Personal Profile Service such that his Postal Code and Nationality will be available to visited SPs. Joe Self then receives personalized service when visiting web sites. In addition, should SPs require additional information, they can directly query Joe Self. The ability to query is provided by the Interaction Services defined as part of the Liberty Specifications.

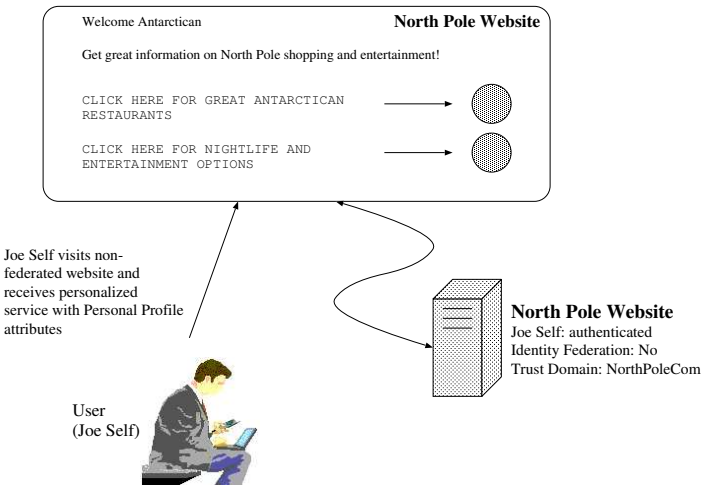

Figure 7. Joe Self visits North Pole website, privacy neutral Personal Profile attributes provided based upon set preferences for new Service Providers

The Mobile Device examples shows a scenario with the optimizations from the use of Reverse HTTP Binding, the use of LUAD for Discovery of Web Services on the mobile device, as well as use of the SOAP Authentication Service for authentication of the LECP.

3. Liberty Engineering Requirements Summary

This section summarizes the Liberty general and functional engineering requirements.

3.1. General Requirements

The Liberty-enabled systems should follow the set of general principals outlined in Section 3.1.1 and Section 3.1.2. These principles cut across categories of functionality.

3.1.1. General Requirements

Liberty Version 1.2 clients encompass a broad range of presently deployed Web browsers, other presently deployed Web-enabled client access devices, and newly designed Web-enabled browsers or clients with specific Liberty-enabled features.

The Liberty Version 1.2 architecture and protocol specifications must support a basic level of functionality across the range of Liberty Version 1.2 clients.

3.1.2. Client Device/User Agent Interoperability

Liberty architecture and protocol specifications must provide the widest possible support for

- Operating systems
- Programming languages
- Network infrastructures

and must not impede multivendor interoperability between Liberty clients and services, including interoperability across circle of trust boundaries.

3.2. Client Device/User Agent Interoperability

Liberty architecture and protocols must be specified so that Liberty-enabled implementations are capable of performing the following activities:

- Service Discovery in identity federation environment
- Registration of Services
- Support for gathering consent from the Principal
- Support for Anonymous Services
- Support for Usage Directives

3.2.1. Service Discovery

Requirements of service discovery stipulate that

- Architecture provides a mechanism for service providers to query the Discovery Service for the relevant providers of services or attribute classes within a service for a particular Principal.

- Support for user prompt by the Discovery Server to prompt during the registration process (e.g. to confirm the registration). Such mechanism(s) should support the ability to allow the requestor to prompt the user, asking the requestor to direct the user to the Discovery Server's site, or the Discovery Server using a LECP communications channel to ask the user directly.

3.2.2. Registration of Services

Requirements of service registration stipulate that

- Architecture provides a mechanism for service providers to register/deregister with the Discovery Service a list of services or attribute classes within a service that it provides for a specific Principal.

3.2.3. Support for Gathering Consent

Requirements of consent gathering stipulate that

- Mechanism for a relying service provider to request that the invoking service provider direct the Principal to the relying service provider to request the Principal for consent.
- Mechanism for a service provider to utilize a LECP communications channel for querying the Principal's consent and obtaining the Principal's response.
- Mechanism for Providers to associate Principal's consent for his/her permissions for a service provider for a given set of attributes, when the set of attributes are shared with the service provider.
- Mechanism for a relying service provider to partially fulfill requests for attributes if consent not given for all attributes.

3.2.4. Support for Anonymous Service

Requirements of anonymous service stipulate that

- Mechanism for a service provider to make anonymous attribute requests and receive anonymous attribute responses. (Ability to share attributes without disclosing the identity of the Principal to the requestor or service provider).
- Mechanism to prevent correlation of pseudonyms in service tokens with Principal Identifiers.

3.2.5. Support for Usage Directives

Requirements of usage directives stipulate that

- Mechanism for a service provider to associate intended usage with the requested attributes in an attribute request to a relying service provider.
- Mechanism for a service provider to associate the agreed upon intended usage directives with the attribute response

- Mechanism for a service provider to return a list of acceptable usage directives to a service provider, when the intended usage doesn't match the Principal's usage directives.

- Guideline for service providers (in the usage negotiation scenario) to always reply to an invoking service provider's attribute request with usage directives that are equal to or privacy-stricter than those originally stated in the service provider's attribute request.

4. Liberty Security Architecture

Table 1 generally summarizes the security mechanisms incorporated in the Liberty specifications, and thus in Liberty-enabled implementations, across two axes: channel security and message security. It also generally summarizes the security-oriented processing requirements placed on Liberty implementations.

Note: This section is non-normative, please refer to normative documents for detailed normative statements regarding security mechanisms.

Table 1. Liberty Security Mechanisms

Security Mechanism	Channel Security	Message Security (for Requests, Assertions)
Confidentiality	Required	Optional
Per-message date integrity		Required
Transaction integrity		Required
Data origin authentication		Required
Nonrepudiation		Required

Channel security addresses how communication between identity providers, service providers, and user agents is protected. Liberty implementations must use TLS1.0 or SSL3.0 for channel security, although other communication security protocols may also be employed, for example, IPsec, if their security characteristics are equivalent to TLS or SSL. Note: TLS, SSL, and equivalent protocols provide confidentiality and integrity protection to communications between parties as well as authentication.

Critical points of channel security include the following:

- In terms of authentication, service providers are required to authenticate identity providers using identity provider server-side certificates. Identity providers have the option to require authentication of service providers using service provider client-side certificates.

- Additionally, each service provider is required to configure a list of authorized identity providers, and each identity provider is required to be configured with a list of authorized service providers. Thus any service provider-identity provider pair must be mutually authorized before they will engage in Liberty interactions. Such authorization is in addition to authentication. (Note: The format of this configuration is a local matter and could, for example, be represented as lists of names or as sets of X.509 certificates of other circle of trust members).

- The authenticated identity of an identity provider must be presented to a user before the user presents personal authentication data to that identity provider.

Message security addresses security mechanisms applied to the discrete Liberty protocol messages passed between identity providers, service providers, and user agents. These messages are exchanged across the communication channels whose security characteristics were just discussed.

Critical points of message security include the following:

- Liberty protocol messages and some of their components are generally required to be digitally signed and verified. Signing and verifying messages provide data integrity, data origin authentication, and a basis for non-repudiation. Therefore, identity providers and service providers are required to use key pairs that are distinct from the key pairs applied for TLS and SSL channel protection and that are suitable for long-term signatures.
  In transactions between service providers and identity providers, requests are required to be protected against replay, and received responses are required to be checked for correct correspondence with issued requests. Time-based assurance of freshness may be employed. These techniques provide transaction integrity.
  D1 To become circle of trust members, providers are required to establish bilateral agreements on selecting certificate authorities, obtaining X.509 credentials, establishing and managing trusted public keys, and managing life cycles of corresponding credentials.

Note: Many of the security mechanisms mentioned above, for example, SSL and TLS, have dependencies upon, or interact with, other network services and/or facilities such as the DNS, time services, firewalls, etc. These latter services and/or facilities have their own security considerations upon which Liberty-enabled systems are thus dependent.

5. Liberty Architecture

5.1. Concepts and Architecture

The Liberty ID-WSF defines a framework for creating, discovering, and consuming *identity services*. The Liberty ID-WSF also defines a conceptual model that provides relevant terminology for these *identity services*. Some basic identity services, such as the Discovery Service, are defined in a normative manner as part of the ID-WSF Specifications. The following UML model describes the conceptual model presented in the Liberty Specifications:

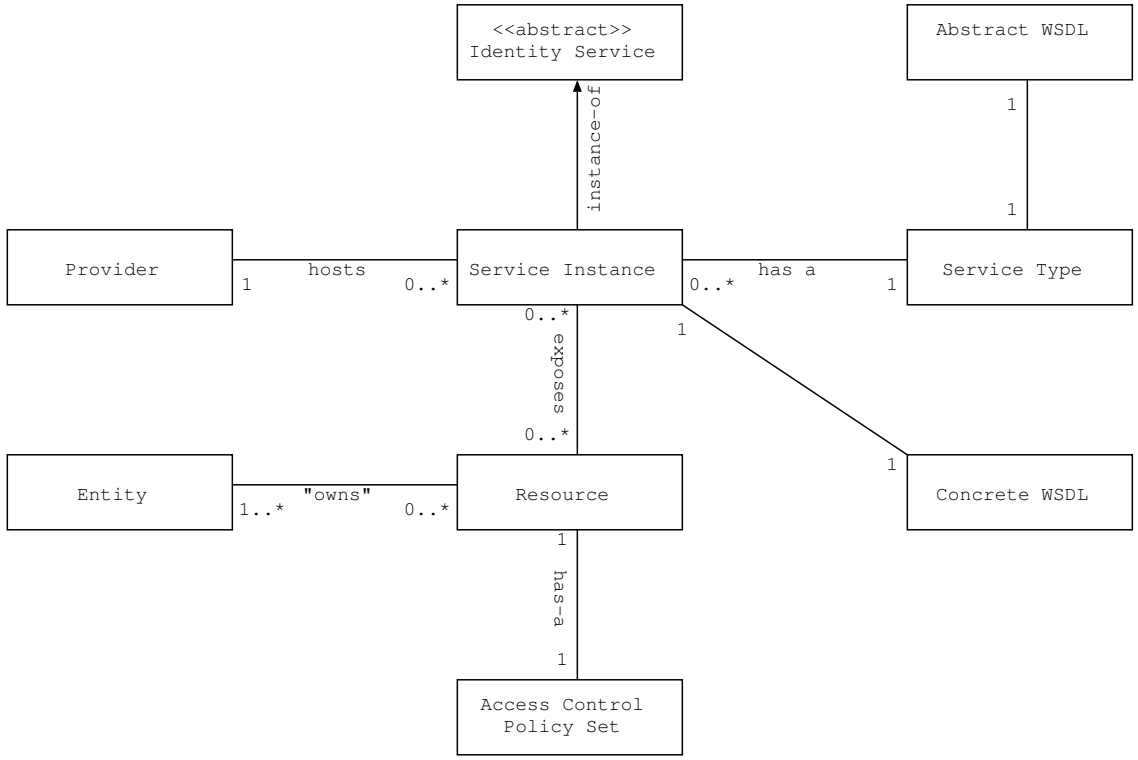

Figure 8. UML Representation of Liberty Conceptual Model

An *identity service* is an abstract notion of a web service that acts upon some resource to either retrieve information about an identity or identities, update information about an identity or identities, or perform some action for the benefit of some identity or identities.

There are different types of identity services, each of which is identified by a *service type identifier*. This service type identifier maps to exactly one *abstract WSDL* definition of a service. The definition contains only the type, message, and portType elements of a WSDL 1.1 description. An example of a service type is a "calendar service," which could have a service type identifier of a URI such as "urn:example:services:calendar".

A *service instance* is the instantiation of a particular type of identity service. A service instance maps to a *concrete WSDL* document (which includes the binding and service WSDL elements) that contains the *protocol endpoint* and additional information necessary for a client to communicate with the particular service instance (e.g., security policy information).

Each service instance is hosted by some *provider* that is identified by a *provider identifier*. An example of a service instance is a SOAP endpoint offering a calendar service.

A service instance exposes a protocol interface to a set of resources. A *resource* in this specification is either data related to some identity or identities, or a service acting on behalf of some identity or group of identities. An example of a resource is a calendar containing appointments for a particular identity.

A resource commonly has *access control policies* associated with it. These access control policies are typically under the purview of the entity or entities associated with the resource (the entity or entities could be considered to "own" the resource). The access control policies on a resource must be enforced by the service instance.

5.2. Liberty Modules

The Liberty architecture consists of a multi-level layered specification set, based on open standards including SAML and SOAP. There are three major components of the Liberty architecture:

- The Liberty Identity Federation Framework (ID-FF) specifies core protocols, schemata and concrete profiles that allow implementers to create a standardized, multi-vendor, identity federation network.
- The Liberty Identity Web Services Framework (ID-WSF) consists of a set of schemata, protocols and profiles for providing a basic framework of identity services, such as identity service discovery and invocation.
- Liberty Identity Service Interface Specifications (ID-SIS) utilize the ID-WSF and ID-FF to provide networked identity services, such as contacts, presence detection or wallet services that depend on networked identity.

Figure 9 below illustrates the Liberty Modules and their corresponding functional areas.

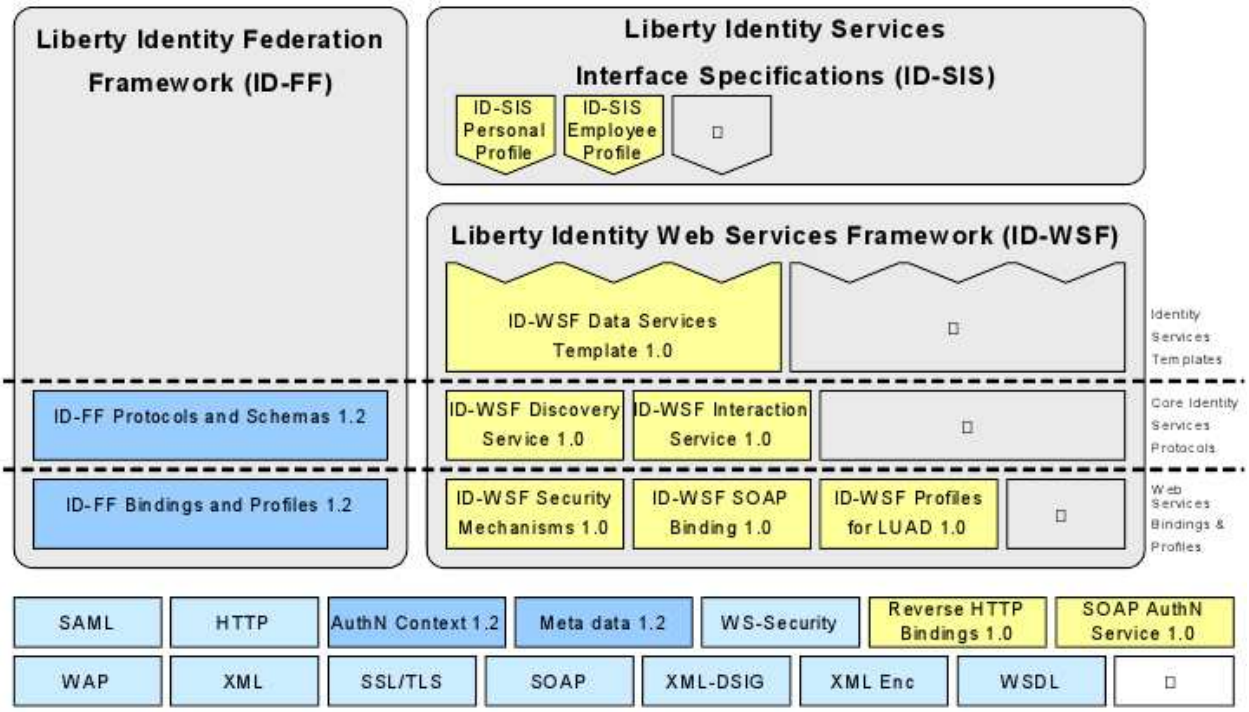

Figure 9. Liberty Modules

5.3. Summary of Functionalities

The Liberty Identity Services Framework defines a SOAP based invocation framework that allows identity services to be discovered and invoked. Once a service has been discovered and sufficient authorization data has been received from a trusted authority, the invoking entity (WSC: Web Services Consumer) may invoke the service at the hosting/relying entity (WSP: Web Services Provider). In order to convey the privilege of a system entity to access a resource, the framework defines extensions such that service invocation authorization data may be generated by a trusted authority and issued to the invoking system entity. The relying party or WSP can make access control decisions based upon this authorization data based upon its business practices and the preferences of the Resource Owner. In most cases this trusted authority is assumed to be some identity provider/Discovery Service.

The following diagram illustrates the entities involved in possible service invocation use cases.

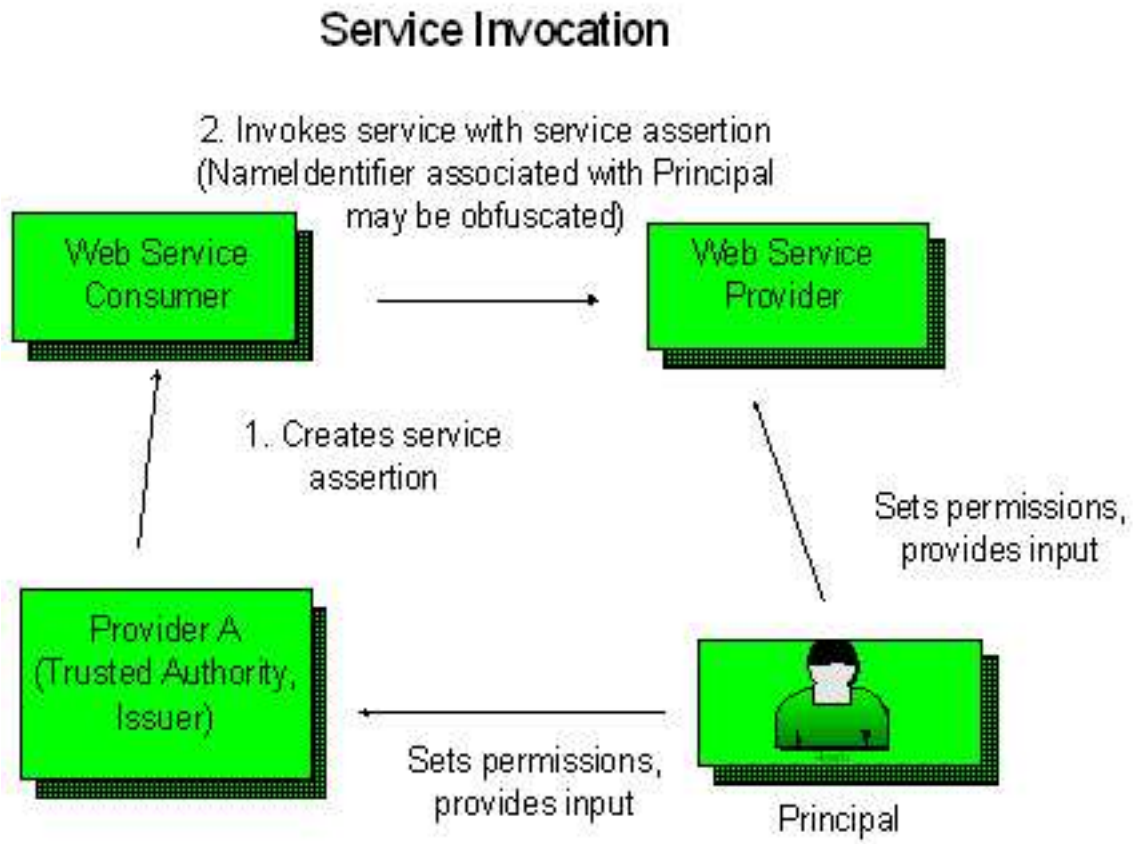

Figure 10. Service Invocation Context

5.3.1. Security Profiles

As in other web services contexts, access control policies must be enforced in an identity services context. The authorization decision to invoke an identity service instance offering a specific resource may be made locally (that is at the entity hosting the resource) or remotely. Regardless of whether the policy decision is distributed or not, in a permissions based context or any context with security considerations, a policy enforcement must always be implemented by the entity hosting the resource.

Identity services may rely upon a trusted third party (TTP) to make policy decisions on their behalf. In such cases, the Trusted Third Party issues targeted SAML assertions to those entities. These assertions have associated conditions,

such as an issue instant, validity periods for each assertion. The SAML assertion also has audience restriction(s) that provide information about the intended target of the policy decision and the relying party (a Web Service Provider) for the particular assertion. The SAML assertion also contains an Authorization Decision Statement which conveys the decision and information about the rights that have been granted to the resource. The Authorization Decision Statement also conveys information about the Subject and the Subject Confirmation Method by which the requesting entity will authenticate itself to the relying party.

5.3.2. Usage Directives

The Liberty ID-WSF defines extensions that allow both the invoking entity and the consuming entity to add one or more Usage Directive SOAP headers to a message. A Usage Directive header in a request from the invoking entity can be understood as "intended usage". It should be noted that should permissions be such that a Usage Directives level in the request cannot be met, the hosting entity must either redirect the invoking entity to the user to query for permission, or deny the service.

5.3.3. Interaction Service

The Liberty ID-WSF defines a Interaction Service (IS) protocol. This protocol provides schemas and profiles to enable an entity to interact with the owner of a resource that is exposed by that WSP. The ID-WSF defines three methods for a WSP to interact with a user:

1. The WSP may send a SOAP response with a RedirectRequest that instructs the WSC to direct the user-agent to contact the WSP at a given URL.

2. The WSP may send a UserInteractionRequest to the endpoint defined in the ISService element.

3. The WSP may try to discover the Interaction Service of the resource owner to enable the WSP to send a userInteractionRequest to that service.

This interaction may be for the purposes of obtaining consent for a particular resource exposure (such as granting access to Personal Profile), obtaining data from the user-agent, or some other purpose. The IS protocol is an optional part of the Liberty ID-WSF. An example of use of the IS would be to query the user for permissions in a web services context.

5.3.4. Delegation

The Liberty ID-WSF supports a restricted form of delegation whereby a system entity can act on behalf of the Principal to access an identity service. To achieve this, Liberty defines a new Subject Confirmation Method, Delegated Holder of Key, which allows delegated access to resources. The delegation functionality can be used in offline scenarios when the Principal is present. As an example an Authorization Decision Statement might allow a delegated entity to update a calendar resource for a particular identity after a flight booking has occurred.

5.3.5. Affiliations

An affiliation allows a group of SPs organized to act as a single entity from the point of view of the customer (usually due to the group acting as a portal or acting as a single company such as TimeWarner and its affiliates). The ID-WSF Authorization Decision Statement defined in ID-WSF allows the use of the Affiliation ID when a trusted authority is granting rights to a member of an affiliation group. An example of the use of affiliations in an application context is an Authorization Decision Statement allowing Travel Affiliation X to update a calendar after a flight booking has occurred.

5.3.6. Chaining of Services/Broker

The ID-WSF architecture provides mechanisms to allow a broker type functionality, whereby a WSC may make a request to a WSP which acts as a broker and makes subsequent requests (as a WSC) to other WSP(s) that have the required information. The Broker subsequently aggregates the data and responds to the originating WSC in the chain. A simple example is profile data that is stored in various places and the broker needs to query the relevant parties for the data prior to responding to a Personal Profile request.

5.3.7. Anonymous Service Requests

The Trusted Third Party may obscure the subject's name identifier for purposes of confidentiality at the Web Service Consumer and any subsequent intermediaries. For this purpose, the ID-WSF specifies a mechanism for creating (at issuer) and consuming (at relying party) encrypted name identifiers. [Notes: still some details to be resolved]

5.3.8. Discovery Service

The Discovery Service is a type of identity service that provides for the discovery of resource exposures associated with a given identity. An identity will typically have one or more discovery services on the network that allow other entities to discover its identity services.

The Discovery Service offers two operations, Lookup and Update. In a web services context (browsing, etc.), a Web Services Consumer may need access to a resource exposure associated with an identity (a profile or location service). The Web Service Consumer may lookup a service instance with a Request that includes a service type element and extensible processing directives. The response message contains the relevant resources associated with the query, according to the access policies set by the principal/provider. The response may include tokens for service invocation.

The Update Operation allows a requester to enter and remove service instances. The Request allows the provider to input information about a resource exposure, and the corresponding Response provides the status of the request. A Web Service Provider that hosts the resource, the host of the Directory Service, or the Principal/Resource Owner could update the resource exposure. The service registry defined by the Liberty ID-WSF has one service entry for each service type , consequently complex queries are not possible. This does not preclude having some ability to change the Lookup results based upon the Access Control Policies of the host, and/or Preferences/Permissions of the resource owner. The following diagram illustrates the entities involved in possible Discovery Service use cases.

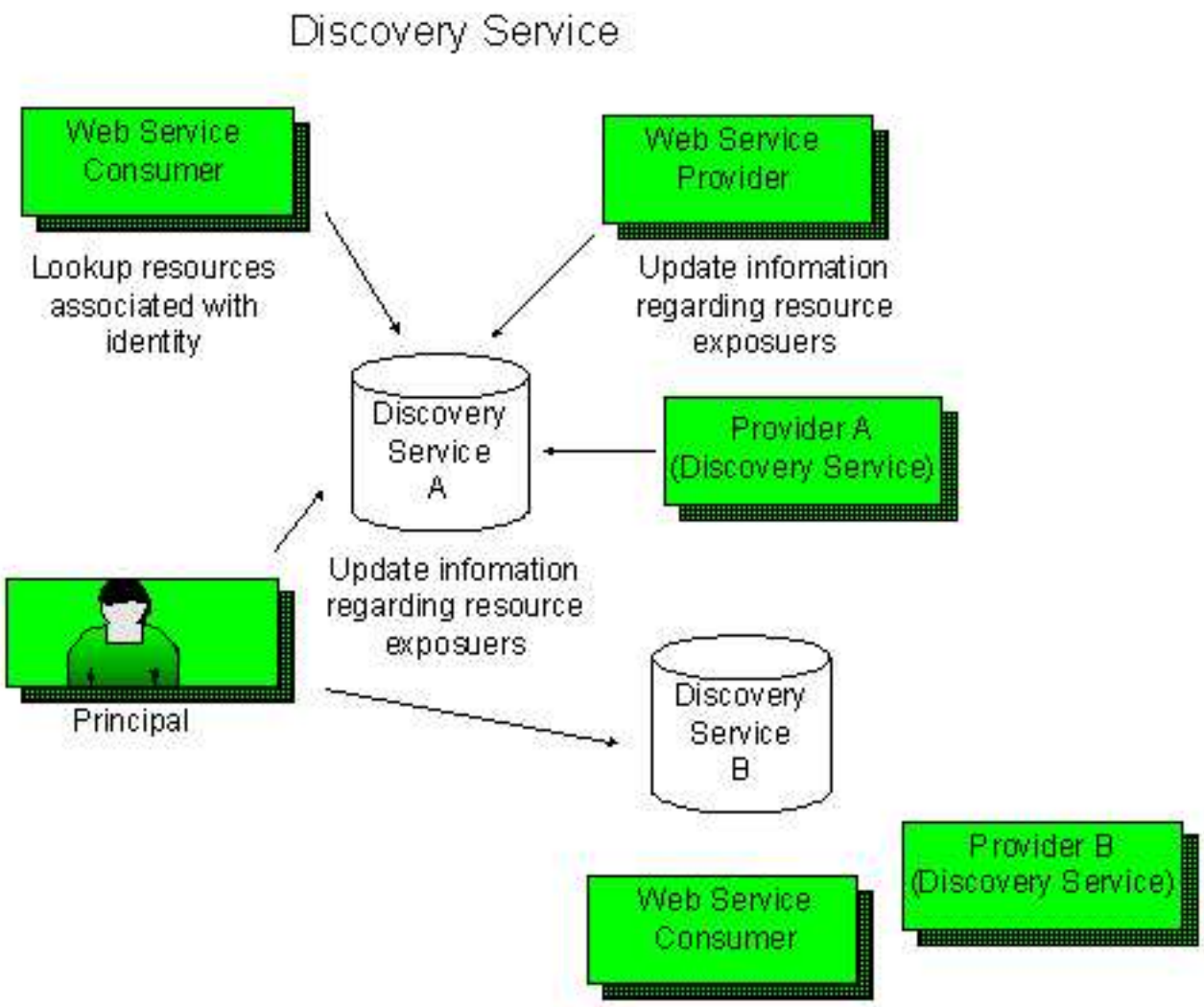

Figure 11. Liberty Discovery Service

5.4. Use Cases in scope for ID-WSF

The Liberty Alliance defines an Personal Profile Service for use with the Liberty ID-WSF. The Personal Profile Service is designed to facilitate account creation in a web services context. The Personal Profile Service allows a Web Service Consumer to gather the information necessary to create an account or provide personalized services. The Personal Profile Specification provides a schema and API for queries of personal information. The ID-WSF provides Personal Profile deployments and other ID-SIS deployments with the abilities to specify and negotiate usage directives for attribute sharing, to query users for permissions using the Interaction Service, as well as the ability to provide anonymous attribute requests for non-identifying Personal Profile attributes (such as zip code).

5.5. Use Cases out of scope for ID-WSF, but relevant to later work

The Liberty Alliance anticipates that other services will be built on top of the Liberty ID-WSF. Some of these services will be specified within the Alliance context, other services will be proprietary applications built on top of the Liberty ID-WSF Architecture. It is anticipated that services such as wallet, calendar, messaging, presence, geo-location and

user groups will be useful in conjunction with the Liberty ID-WSF. These services may be formally specified by the Alliance.

References

Informative

[LibertyGlossary] "Liberty Technical Glossary," Version 1.2-21, v1.2-21 Liberty Alliance Project (27 Feb 2004). *http://www.projectliberty.org/specs* Hodges, Jeff, Wason, Thomas, eds.

[RFC2119] Bradner, S., eds. "Key words for use in RFCs to Indicate Requirement Levels," RFC 2119, The Internet Engineering Task Force (March 1997). *http://www.ietf.org/rfc/rfc2119.txt [March 1997]*.

[SOAPv1.1] "Simple Object Access Protocol (SOAP) 1.1," Box, Don, Ehnebuske, David , Kakivaya, Gopal, Layman, Andrew, Mendelsohn, Noah, Nielsen, Henrik Frystyk, Winer, Dave, eds. World Wide Web Consortium W3C Note (08 May 2000). *http://www.w3.org/TR/2000/NOTE-SOAP-20000508/*

[wss-sms] Hallam-Baker, Phillip, Kaler, Chris, Monzillo, Ronald, Nadalin, Anthony, eds. (June 30, 2003). Organization for the Advancement of Structured Information Standards *http://www.oasis-open.org/committees/download.php/2757/WSS-SOAPMessageSecurity-14-063003-merged.pdf* "Web Services Security: SOAP Message Security," Draft WSS-SOAPMessageSecurity-14-063003,

[SAMLCore11] Maler, Eve, Mishra, Prateek, Philpott, Rob, eds. (27 May 2003). "Assertions and Protocol for the OASIS Security Assertion Markup Language (SAML) V1.1," OASIS Committee Specification, version 1.1, Organization for the Advancement of Structured Information Standards *http://www.oasis-open.org/committees/documents.php?wg_abbrev=security*

[WSDLv1.1] "Web Services Description Language (WSDL) 1.1," Christensen, Erik, Curbera, Francisco, Meredith, Greg, Weerawarana, Sanjiva, eds. World Wide Web Consortium W3C Note (15 March 2001). *http://www.w3.org/TR/2001/NOTE-wsdl-20010315*

[XML] Bray, Tim, Paoli, Jean, Sperberg-McQueen, C.M., Maler, Eve, eds. (Oct 2000). "Extensible Markup Language (XML) 1.0 (Second Edition)," Recommendation, World Wide Web Consortium *http://www.w3.org/TR/2000/REC-xml-20001006*

[xmlenc-core] Eastlake, Donald, Reagle, Joseph, eds. (December 2002). "XML Encryption Syntax and Processing," W3C Recommendation, World Wide Web Consortium *http://www.w3.org/TR/xmlenc-core/*

[XMLDsig] Eastlake, Donald, Reagle, Joseph, Solo, David, eds. (12 Feb 2002). "XML-Signature Syntax and Processing," Recommendation, World Wide Web Consortium *http://www.w3.org/TR/xmldsig-core*

[RFC2246] Dierks, T., Allen, C., eds. (January 1999). "The TLS Protocol," Version 1.0 RFC 2246, Internet Engineering Task Force *http://www.ietf.org/rfc/rfc2246.txt [January 1999]*.

[SSL] Frier, A., Karlton, P., Kocher, P., eds. (November 1996). Netscape Communications Corporation "The SSL 3.0 Protocol," *http://www.netscape.com/eng/ssl3/*

[LibertyDisco] Sergent, Jonathan, eds. "Liberty ID-WSF Discovery Service Specification," Version 1.0-08, Liberty Alliance Project (24 July 2003). *http://www.projectliberty.org/specs*

[LibertySOAPBinding] Hodges, Jeff, Aarts, Robert, eds. " Liberty ID-WSF SOAP Binding Specification ," Version 1.0, Liberty Alliance Project (12 November 2003). *http://www.projectliberty.org/specs*

[LibertySecMech] Ellison, Gary, eds. "Liberty ID-WSF Security Mechanisms," Version 1.0, Liberty Alliance Project (12 November 2003). *http://www.projectliberty.org/specs*

[LibertyIDPP] Kellomaki, Sampo, eds. "Liberty Identity Personal Profile Service Specification," Version 1.0, Liberty Alliance Project (12 November 2003). *http://www.projectliberty.org/specs*

[LibertyDST] "Liberty ID-WSF Data Services Template Specification," Version 1.01-03-errata, Liberty Alliance Project (15 January 2004). *http://www.projectliberty.org/specs* Kainulainen, Jukka, Ranganathan, Aravindan, eds.

[LibertyInteract] Aarts, Robert, eds. "Liberty ID-WSF Interaction Service Specification," Version 1.0, Liberty Alliance Project (12 November 2003). *http://www.projectliberty.org/specs*

[LibertyBindProf] Cantor, Scott, Kemp, John, eds. "Liberty ID-FF Bindings and Profiles Specification," Version 1.2-errata-v1.0, (18 April 2004). *http://www.projectliberty.org/specs*

[LibertyMetadata] Davis, Peter, eds. "Liberty Metadata Description and Discovery Specification," Version 1.0, Liberty Alliance Project (12 November 2003). *http://www.projectliberty.org/specs*

[LibertyPAOS] Aarts, Robert, eds. "Liberty Reverse HTTP Binding for SOAP Specification," Version 1.0, Liberty Alliance Project (12 November 2003). *http://www.projectliberty.org/specs*

[LibertyAuthn] Hodges, Jeff, Aarts, Robert, eds. " Liberty ID-WSF Authentication Service Specification ," Version 1.0-16, Liberty Alliance Project (26 Feb 2004). *http://www.projectliberty.org/specs/ [http://www.projectliberty.org/specs/]*