                         The IMX Architecture
      Interoperability with America Online's Instant Messaging Services

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Abstract

  The ability to exchange instant messages and presence information
  provides users with a powerful mechanism for communicating in
  real-time.

  This document outlines an architecture for interoperability among
  Instant Messaging Systems which allows disparate systems to
  exchange messages and presence information while being
  relatively easy to implement and maintaining a high standard of
  security and scalability.

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1. Introduction

   Today's instant messaging systems are typically comprised of a
   client, through which the end-user interacts, and servers which relay
   information between compatible clients.  Tight integration between
   clients and servers allows instant messaging services to provide a
   secure, reliable channel through which authentication, presence, and
   messaging information is passed between users and the service.

   As the number of instant messaging providers has grown, there is
   increased interest in enabling IM users to exchange presence and
   messaging information not only with users on their system, but
   with those on other systems as well Some vendors have responded by
   creating "multi-headed clients," clients which can simultaneously
   communicate with servers on disparate instant messaging systems.

Such clients achieve interoperability at a high price, however.
Since each service has its own feature set, clients may advertise
features that do not work across systems.  Since each service
implements its own security model, multi-headed clients must
often resort to mechanisms that circumvent security or require
the user to provide passwords to third parties.  Inconsistent
terms of service also make it difficult to enforce anti-spam
measures or encourage equitable resource sharing.  And vendors
are forced to constantly upgrade clients to keep up with
changes in features and services across the instant messaging
universe.

An alternative approach is to provide a mechanism for the services
themselves to interoperate in a peering arrangement, much like the
Internet mail system works today.  In such a system, the interaction
between instant messaging clients and their associated servers would
remain much as it is today, but servers could communicate with other
servers to exchange presence information, messages, or other data.
This approach helps to preserve existing models for security
and allows Instant Messaging Service providers to manage client
authentication, service policy, and privacy.

This document describes how America Online intends to develop such
an architecture to allow its services to discover other servers
(and be discovered by other servers), exchange data, and ensure
security.  It also describes implications that any architecture for
interoperability may have for the spread of unsolicited instant
messaging (spam).

2. Requirements

The authors set out to design a system that would be flexible,
yet practical to implement.  In that vein, many of our design goals,
listed below, are the same as or similar to those specified in
[RFC 2779], but with additional consideration paid to implementation
issues.

The primary requirements were to design a system which:

1) is scalable to hundreds of millions of instant messaging users.

2) is scalable to hundreds of thousands (or perhaps millions) of
   individual instant messaging systems and domains, so every
   company or ISP could have its own instant messaging system.

3) allows existing instant messaging implementations to manage
   their own user namespace.

4) is self managed (like the Internet mail system) such that new
   servers and new systems could be added without administration

by some central authority and without manual administration
by other service providers.

5) initially supports at least five main end-user features:

   - Requesting/Renewing/Canceling presence subscriptions
   - Sending/Receiving presence notifications (in response to a
     subscription)
   - Routing and delivery of instant messages
   - Retrieval of named user attributes (at minimum an "alias"
     and current presence state)
   - Retrieval of named domain attributes

6) allows traffic between users in a single instant messaging
   system to stay within that system.

7) makes it possible to implement interoperability between
   instant messaging systems by adding gateways to existing
   systems without rearchitecting existing core systems.

8) is extensible, so new features can be added incrementally
   without requiring redesign and while allowing for backwards
   compatibility.

9) has a well thought-through security strategy such that:

   - Messaging data or state can't be easily spoofed or replayed
     by a third party
   - Messaging data or state can't be easily intercepted,
     hijacked, or stolen by a third party
   - More advanced security measures such as end-to-end
     encryption or signing can be layered on top of the initial
     implementation, but are not required in the initial
     implementation.

   10) easily supports clients that are inside of a common company
       firewall (e.g. incoming connections are often refused).

   11) easily supports international usage.

   12) leverages existing standards in as many places as practical.

3. Terminology

  [RFC 2778] specifies a common terminology for the discussion of
  Internet Messaging and Presence Protocol information; however, that
  document defines terms which are considerably more granular than
  are required by this document.  Accordingly, this document uses
  the following terms:

Aggregator - A special kind of Gateway, which services multiple
 domains and routes messages between other IMX Servers and
 Servers which service a particular domain.  The protocol
 between the Aggregator and each Server is arbitrary.  An
 example of an Aggregator might be a Gateway which acts as
 a front-end to multiple, privately-labeled Instant Messaging
 Services.

Attributes - metadata about an End User, such as a nickname or
 alias; or about a domain, such as a timeout value.  Attributes
 consist of a key, which is scoped at a domain, and a value.
 It may be desirable to have certain attribute keys which are
 global to the IMX architecture and interpreted identically
 by all participating services.

Data - any of Instant Messages, Attributes, Notifications,
 Subscriptions, or requests for these that are exchanged
 between Servers.

End User - a human or other entity whose presence information is
 reflected by the service and who can send and receive Instant
 Messages through an Instant Messaging Service.

Instant Message - a short, real-time or near-real-time message
 which is sent between Instant Messaging clients.  While this
 document does not prescribe a definition for "short," the
 intent is to prevent streams of arbitrary length from
 being sent as Instant Messages.  This is consistent with the
 definition of an INSTANT MESSAGE in [RFC 2778].

Instant Messaging Client (or Client) - a User Agent which provides
 an End User with the ability to initiate and receive Instant
 Messages, and request Subscriptions and receive Notifications for
 Presence Information.  This term is used in this document to
 encompass a SENDER, INSTANT INBOX, PRESENTITY, and WATCHER in
 [RFC 2778], and is roughly consistent with the generic description
 of an "instant messenger" in section 2.7 of that document.

Instant Messaging Gateway (or Gateway) - a special type of
 Instant Messaging Server which does not communicate directly
 with Clients but sits between Servers which service a particular
 domain and the world of other IMX servers.  Gateways act
 essentially as routers, potentially performing protocol
 translation between an Instant Messaging Service's local
 protocols and the IMX protocol.  An example of a
 Gateway would be a Server which routes messages to an
 already existing, private Instant Messaging Service.

Instant Messaging Server (or Server) - an entity which
 maintains Presence Subscriptions for and delivers Instant

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