# UNDERSTANDING UNIFIED MESSAGING

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**Abstract**

Messaging systems such as Instant Messaging (IM) and mobile messaging (SMS/MMS) have gained increased usage in professional, academic, and social applications. This proliferation of multiple messaging systems has increased the complexity of effectively using and managing messaging systems. This paper provides an introduction to the concept of Unified Messaging (UM) systems; provides examples of client based and server based UM architectures, and identifies the underlying business needs that are driving the development of UM systems.

## I. INTRODUCTION

Do you need to send an SMS message to a friend? You will most likely have to use your cell phone to do that. Do you need to use Instant Messaging to find out if a customer or co-worker is available for a quick meeting? That will probably require you to use a different messaging interface – which may or may not be available or installed on your device. Do you know which IM system the person you are trying to reach uses? Are they users of Google Talk, AIM, Windows Messenger, or one of the many other IM systems now available? If you do not have the correct type of IM client available on your device, you probably won't be able to contact them through Instant Messaging .

Many of us have become so used to working with multiple stratified communications systems (Fig. 1) that we do not consider it unusual to come into the office and start the day by:

– checking for voice mails using a desk phone or a dedicated interface;

– logging into one or more email systems to check for mail messages;

– starting up one or more IM systems.

When you retrieve a voice mail, you must decide how to take action: do you forward the voice mail message, return the call, use an IM system to check availability, or follow up by email? Many of us barely notice that we are hopping between messaging interfaces throughout the workday, or that we are required to remember the best way to communicate with different people.

This is the problem that Unified Messaging (UM) seeks to solve. The goal is to provide the user with a single *unified* user interface that brings all of these messaging systems together.

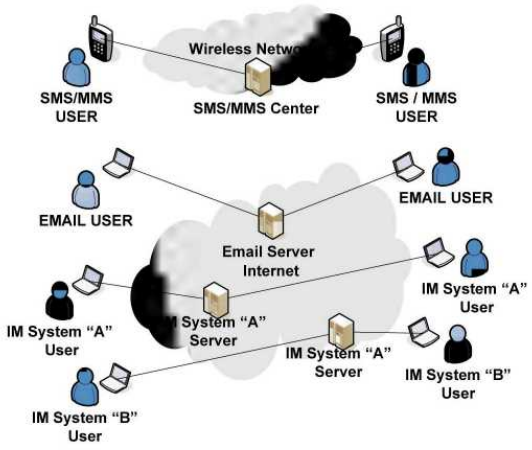


Fig. 1. A typical stratified communications system. Messaging system users can communicate with other like users, but they cannot send messages to users on different systems. For example, the SMS user can send a message to another SMS user, but the SMS user cannot send a message to an IM user. Many Instant Messaging (IM) systems on the market cannot communicate with each other; in this example, IM system A users cannot communicate with IM system B users. The SMS, email, and ГМ users may be the same person; however, the user must use different devices or interfaces to use each system.

The vision of UM is complicated by the fact that many messaging systems have unique characteristics that reflect the communications domains they were initially developed for:

– Voice mail: Developed for fixed and mobile telephony systems. Normally accessed through the user's fixed or mobile device/telephone. Usually only invoked when a user is not available for a voice session, or chooses not to answer a request for a voice mail session.

– SMS/MMS: Developed for mobile telephony systems. Normally accessed through the user's mobile device. Sends text messages asynchronously to the destination(s) user. MMS adds the ability to add rich content to the message such as URLs, graphics, photos, videos, or other content.

– Email: Developed initially for fixed and later mobile computer terminals. Sends messages

asynchronously, and supports attaching or embedding rich content

– Instant Messaging: Developed initially for fixed and later mobile computer terminals. Instant messaging uses (or emulates) a session-based model to support texting and the sharing of rich content between users. Most popular IM systems incorporate the concept of "Presence" in some form. Presence capabilities in IM systems provide information about the availability and willingness of remote parties to communicate prior to initiating an IM session.

Specific messaging systems are normally available only on certain device types, and through specific messaging interfaces. For example, the email interface that you use on your PC to compose and send a message is not the same interface you would use to chat over IM. As a result of this fragmentation, messaging users often find it necessary to work with multiple windows open on their computer desktop- one or more email clients and separate desktop or web clients for Skype, Google Talk, and your corporate voice messaging system.

A key goal of Unified Messaging is to replace those separate interfaces with a single unified messaging interface, without losing any functionality. You could have a Unified Messaging interface that is available on a desktop, laptop, PDA, Cable Box, and even your mobile device. This UM client may provide a shared phone book/ directory from which you can send any kind of message to any other user, no matter which messaging system they are on. Your personal directory is synchronized across all of your UM capable devices.

You only need to indicate *who* you wish to communicate with, and the UM client allows you to send a text message by SMS or SIP messaging, or start an active IM session. The UM system is responsible for determining *how* the message must be delivered to the destination. (Fig. 2).

The UM solution will use presence information to help make this decision. Presence information can tell the UM application which forms of communication are available *now* for a specific user; this information indicates the current set of communications services you support. Presence information may also indicate your willingness to communicate; you may be in a meeting or simply wish to make it clear to others that you do not wish to be disturbed at this time.

The UM interface should provide the user with a set of communications options (i.e. a choice to communicate using a test message, email, IM session, or other method) based on the known current service capabilities of the remote user. This allows the user to select the preferred communications method. The UM system uses presence information to ensure that the offered capability is available and appropriate for the indicated destination.

UM can provide the user with a unified repository where all SMS, MMS, email, SIP text, IM, and voice mail messages are available. UM eliminates the need to jump between devices and messaging interfaces. No more must the user log in separately for each communications account; all messaging needs are available in one converged interface.

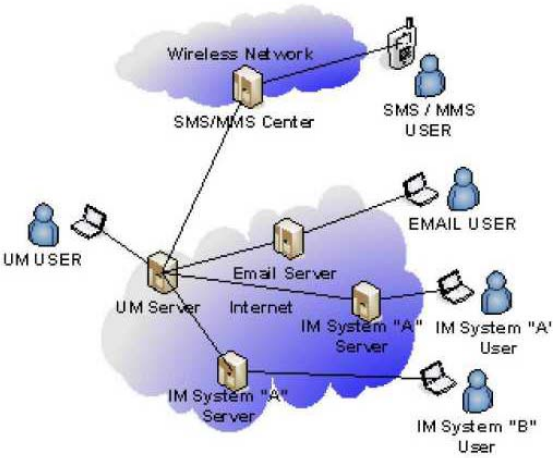


Fig. 2. Illustration of a server based Unified Messaging system. Note that the UM User and client only communicates with the UM server; the UM server is responsible for interworking with all other messaging servers.

"Unified Messaging" is a generic term and does not correspond to specific industry standards or specifications that define the technical details of UM functionality. The term "UM" is often used to describe a subset of the functionality provided in the "Unified Communications" (UC) concept. In the July issue of IEEE IT Pro, Keri Schreiner [1] provided an overview of both UM and UC which analyzed two proprietary UM implementations. However, neither of the implementations Schreiner examined fully support the comprehensive UM functionality defined here.

The UM solution must deal with an ever-increasing level of complexity in the messaging market. The UM solution must support the integration of communications via Instant Messaging as well as support for asynchronous messaging methods including email, SMS/MMS, and other text messaging systems.

Studies confirm that Instant Messaging has become an increasingly important means of communications in the workplace [2]; therefore the enterprise UM solution should support Instant Messaging capabilities which provide interoperability with any existing Instant Messaging Systems that may already be used within the enterprise. Integrating IM into the UM solution is complicated by the proliferation of specific messaging system brands, such as AOL, MSN, Skype, Yahoo, Google, each of which presents unique integration and interoperability issues.

A comprehensive UM solution will only be realized if the necessary business case is made. Schreiner points out in his article how difficult it is to define ROI for the UM solution. Is there really a value proposition here, or is Enhanced Messaging just another cool toy on the horizon?

UM does have a tangible value proposition. The business case discussion for UM should consider

the following benefits:

— For the consumer market:

– Decreased complexity: One messaging interface rather than several. Use this to build a customer base that prefers to use a specific UM client implementation.

– Device convergence: Get all messages on the same device – no need to go to mobile device for SMS or laptop to IM. Provide a multiscreen experience across PCs, mobile devices, and set-top boxes.

– Increased convenience:

◦ sign in once to a converged interface;

◦ a single converged message repository.

— For the service provider:

– UM as a discriminator (others do not have it) to build customer base or maintain loyalty.

– Messaging revenues.

– Own the UM portal (the users are looking at your logo and ads rather than a competitors).

— For the enterprise customer: The same benefits as the consumer, plus:

– Increased Productivity (hard to quantify).

– Converged enterprise directory.

– Improved employee communications.

— For the System Administrator:

– Centralized administration:

◦ increased control. All messaging traverses the UM server;

◦ centralized message repository (back up/ regulatory requirements).

– Security:

◦ reduce use of out of band, unauthorized messaging systems;

◦ gain visibility on out-of band messaging (now traverse UM infrastructure).

Sustaining a deployed UM solution will be complicated by continuous changes and updates to existing messaging systems; these changes will require continious adaptation by the UM system. Integration will be difficult or impossible with some proprietary messaging systems; the owners of these systems are content with their current market segment, and see no benefit in integrating their system with an UM solution that may take customers away from their own messaging portals.

Any single UM solution will probably never integrate all possible stratified messaging systems. A key to the success of any specific UM solution will require the wise selection of messaging systems for integration into that UM solution. The selections made should be driven by the needs of that UM system's targeted market; messaging system requirements may differ greatly between consumer and enterprise solutions.

UM provides much more than a simplified interface for messaging users. The IT professional constantly faces new challenges that are a direct result of the proliferation of stratified messaging systems. UM will be an important tool in dealing with these challenges. For example, UM will help to alleviate the following problems, which may already exist in your networks:

— Manage employee use of unauthorized messaging systems. Using unauthorized (not managed by the IT department) messaging systems causes many problems. This includes lack of positive user authentication and control; verification of participant identity in official conversations, inability to record/document messages or conversations. Specific examples of unauthorized messaging systems include:

– Instant Messaging Systems: These include authorized systems, which do not maintain records of communications as well as use of unauthorized IM systems. For example, you use a corporate Microsoft Messenger system for your internal communications, but you use Google Talk or AIM to talk to customers or to co-workers that "prefer" another IM system.

– Collaboration Systems: These include meeting tools and suites (such as Microsoft NetMeeting or Backpack) which provide messaging and file transfer capabilities. Most of these are proprietary systems, and many new collaboration systems are completely web based.

– Email systems: Is there anybody under 21 that still has just one email address? Access of unofficial email systems from work computers remains a serious system and security vulnerability.

– Mobile Messaging systems: The use of mobile messaging (SMS and MMS) is undergoing tremendous growth in the United States. These types of messaging systems have been the most popular messaging system in other countries for many years now [3, 4] and our finding their way into the US workplace.

— Failure to record/maintain records of official communications. Persons in your organization are using non-approved messaging systems to conduct official business. These communications are not being maintained and stored by the organizations. There are two very good reasons for a corporation to maintain good communications records:

— Sarbanes-Oxley, and other regulatory compliance: The Sarbanes-Oxley Act mandates that all business records, to include electronic records and electronic messages, must be saved for a minimum of five years. The corporation may be found liable if it is determined to have failed to maintain the necessary records;

— Internal business purposes: Most corporations have policies for establishing and maintaining records of all business related communications. There is no assurance that the required records are maintained when unofficial communications means are used.

Your organization undoubtedly already has policies in place to prevent the use of unauthorized messaging systems and to maintain official records. The effectiveness of these policies can vary greatly

across and with organizations. The effectiveness of these policies may also be influenced by organizational and geographical cultural influences [5].

## II. SERVER AND CLIENT-BASED UM SOLUTIONS

There are several important differences between a client-based UM solution and a server-based UM solution.

A server-based UM solution (Fig. 2) provides significant benefits by providing a single path for messaging communications through the UM server. This provides a centralized point for access and account management, as well as record-keeping.

In a client-based UM solution (Fig. 3), the client provides the user with a single interface where all of the messaging systems are accessed. However, the client-based UM solution implements this by emulating the functionality required for each different messaging system. This means that the client must have the necessary credentials (account and password) and the functionality (protocol, server addresses) required to log separately into each messaging system server. As a result, the client-based UM solution places the burden of integration on the client. There are four different sets of sign-in credentials, four different messaging servers, four different paths for messages to flow, and four different source phone books. There is also a possibility of increased client to network traffic (four different sign-ins, registrations, connection maintenance methods, presence information, etc.) as compared to a true server-based approach.

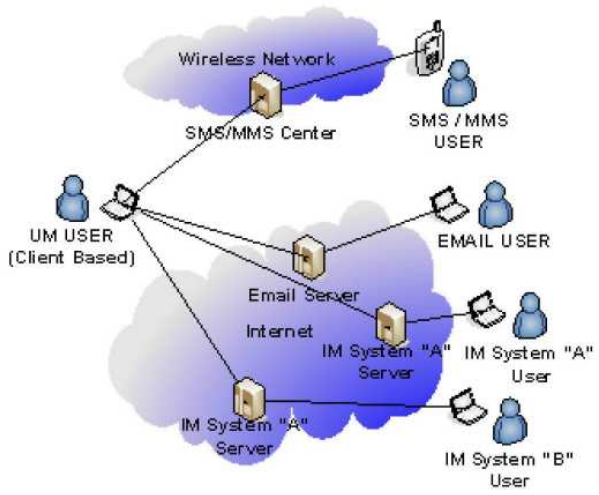


Fig. 3. Illustration of a client server based Unified Messaging system. Note that the UM User and client only communicate with a UM server; the UM server is responsible for all interworking.

Fig. 2 illustrates the server based UM solution. Unlike a client based solution, the server based solution only needs one set of credentials at the messaging client- for accessing the UM server. The UM server is responsible for interworking with any external messaging systems. All messaging traffic from the UM client will traverse the UM server in the network. Therefore, the UM server can provide a centralized message management and storage capability that can provide visibility and some level of control over multiple messaging systems.

Corporate entities have a number of strong business and regulatory based requirements to drive the need for a more centralized capability to manage and control messaging traffic. This indicates that a server-based UM model will be most beneficial for corporate/enterprise applications.

This does not mean that there are not valid reasons to use a client-based UM solution. Let's examine some of the advantages and disadvantages of the client based UM architecture:

— Advantages of client-based UM solution:

– Simple to implement: Emulate / reuse normal client behavior

– Available now: There are a number of client-based unified messaging and email clients available now for many terminal and device types

– Little or no network infrastructure impact (clients talk directly to existing messaging system servers, no true "UM" server).

— Disadvantages of client-based UM solution:

– New functionality must be developed and deployed to client to support new messaging server types. With a true UM client, the interoperability is server-to-server; adding new interfaces should be mostly transparent to the UM Client.

– Not true Single-Sign-On. The client-based UM solution client must have credentials for, and log into, multiple servers.

– There is no single UM server that controls and monitors (store) traffic to the client-based UM client. Some traffic flows directly between the client-based UM solution and "uncontrolled" servers.

– Converged contact list is an artificial construct. The contact list shown in a client-based UM solution is not centrally controlled and managed by the user. It is actually a view of several contact lists that are displayed together. You often cannot effectively manage merged contacts in the "converged" list unless you log directly into the correct messaging interface which is the source of that contact. In a server based UM solution, there is a capability being developed for centralized address books that can operate across communications systems and which can be managed through a single interface.

## III. UNIFIED MESSAGING: WHAT IS AVAILABLE NOW

Major messaging system providers are aware of the desire for UM; as a result, some of these providers are developing functionality to meet these

needs. For example, the desire to communicate across IM systems has helped drive the development of a messaging and presence protocol (XMPP) that is playing a key role in establishing interoperability between formerly stratified IM systems.

Until recently, the corporate messaging system was relatively simple and centered on email communications. These email systems are now being extended to mobile devices (for example, using Blackberry devices and Microsoft Exchange), but these solutions do not yet provide a fully converged mobile messaging experience. The user can send and receive both emails and SMS messages from a mobile device through a single inbox; however, they likely cannot do the same from your laptop computer through a unified interface- the laptop probably does not support SMS messaging. One hallmark of true UM capability will be convergence across both the messaging systems and messaging device types (PC, mobile device, web access).

Many enterprise environments are essentially a hodgepodge of different messaging systems which were deployed (and are maintained) separately. There is often very little interoperability between these systems. These systems may include separate corporate voice mail systems, e-mail systems, PABXs, or instant messaging systems which simply cannot communicate with each other.

There are now systems available with some UM capabilities. For example, Microsoft has done a great deal of work to provide a unified messaging experience across Microsoft Exchange Mail, Microsoft Communicator IM, and even voice mail systems and telephony integration. However, these proprietary solutions require the enterprise to purchase and deploy Microsoft components for the best UM experience, and do not currently support the full range of messaging convergence.

The use of messaging solutions that provide some level of UM is increasing. These solutions are developing capabilities to integrate additional messaging systems into their solution. However, the comprehensive UM solution is simply not there yet.

A key reason the comprehensive UM solution does not yet exist today is that the common interfaces and protocols required to achieve full interoperability between messaging systems are not fully defined. The vision of UM is understood, but work is still needed to define the specifications and standards that are necessary in order to realize UM.

## IV. UNIFIED MESSAGING: FUTURE DIRECTION

There is a great deal of work being done now to define and realize UM functionality through the messaging industry and associated standards organizations. Two examples of key efforts in this area are:

— Converged IP Messaging (CPM): A SIP centric approach to UM managed by the Open Mobile Alliance (OMA). The stated goal of CPM is to define an enabler "...to allow for both the consolidation of present and the creation of future interpersonal interactive multimedia communication services which accommodate different user experiences such as deferred and Immediate Messaging, session-based messaging, and half duplex/full duplex conferencing." The CPM effort aligns with and leverages other OMA standards as well as the IP Multimedia Subsystem (IMS) specifications defined by the 3rd Generation Partnership Projects (3GPP and 3GPP2.) [6].

— Enhanced Messaging (EM): Also a SIP centric approach focused on non-IMS messaging for mobile 2G devices based on recommendations defined by the CTIA-The Wireless Association's Wireless Internet Caucus (CTIA-WIC) Enhanced Messaging Action Team. Also leverages some OMA standards work, but is focused on the integration of mobile messaging with IP based messaging systems across mobile carriers [7].

Both CPM and EM define requirements and standards that are moving the industry towards a more comprehensive UM solution, but neither of these standards yet define all of the functionality required for full UM functionality.

## V. CONCLUSION

The terms "UM" and "UC" are being thrown around quite freely by many in the messaging field. Jack Santos [8] makes the following observation in CIO Magazine: "UC is still a vision and long-term strategy — really the recognition of an overall trend with communications... vendors take the UC moniker and run with it... to sell products that may or may not be ready for prime time. The reality is unified communications will only be real when applications are developed based on the underlying technologies — and so far there has been no "killer app.""

This is an important perspective. The comprehensive UM solution is not yet available on the market. However, there are a number of high quality applications available that provide UM capabilities across specific messaging systems. Some of these applications will meet your organization's near term needs. Conversely, some of these applications may "look" converged but fail to provide the centralized control and management capabilities required to gain meaningful ROI.

As UC and UM related standards mature, more sophisticated UM capable products will begin to appear on the market. For the enterprise IT Manager, these UM capabilities are beginning to provide centralized access, control, and management over highly fragmented stratified messaging systems.

Investigate and assess these emerging UM capabilities with a critical eye, and ensure that applications touted as providing Unified Communications or Unified Messaging capabilities are in fact providing you with meaningful value and ROI.

In the meantime, you must continue to manage your existing messaging systems. Ensure that you are aware of the risks of using stratified or unauthorized messaging systems. Develop and enforce clear policies to increase awareness and reduce your vulnerabilities. Until that perfect UM solution comes along, you have a lot of different messaging systems to manage.

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