

Email Delivery of VoIP Voicemail

By Martin Dunsmuir



Voicemail has been with us for many years. To listen to messages in a traditional voicemail system, the owner of the mailbox calls over the phone and uses the phone keypad to manage their voice mailbox. Although, from the voicemail system's point of view, messages are simply digital audio files, it is only in the last ten years that the voicemail industry has begun integrating their products with the network, to implement new, digital features on the backend. The most important feature to emerge in this regard is the ability of the voicemail system itself to deliver voicemail messages by email, as audio attachments. Messages are captured by the voicemail system, automatically encoded and sent to the recipient's email address. The user no longer needs to call for their voicemail over the phone (although this may remain an option), instead they can use their computer to access their voicemail messages. The user's voicemail and their other email are all accessed through the same interface and their email and voicemail are said to be "unified."

Until recently, the provision of email forwarding has proceeded in parallel with the rollout of corporate Voice over IP (VoIP) systems. It made sense for the implementers of corporate VoIP systems to take full advantage of the corporate network and the flexibility of a general purpose computer platform, such as Windows or Linux, or Unix. Corporate VoIP systems, therefore, typically implement a whole range of features, which take advantage of a flexible networked, computer platform.

Now, with the rise of public, VoIP-based, phone services, such as Vonage and AT&T CallVantage, features such as email forwarding are beginning to be rolled-out to consumers. This article we will discuss the technical aspects of implementing voicemail forwarding to email within the context of a public VoIP service and explore the usability, scalability, and inter-operability challenges that the feature poses.

How voicemail forwarding works: In concept, voicemail forwarding is simple. There are three steps: first, the audio must be captured from the phone, encoded and stored in a digital data file; second, the digital file must be delivered as an attachment via a correctly formatted email message; and, thirdly, the user must be able to playback the message within their email client..

The choice of encoding format is relevant for three reasons: first, the need to record the message at a quality which retains the fidelity of the original telephone call; second, the need to deliver the message to the end-user in a format which they can easily playback; and, thirdly, the need to conserve space on the voicemail system and the network bandwidth used to deliver it. By choosing the most effective compression parameters and codec to meet the first two requirements. Since the end-user should be

spared the need to download a special software to listen to voicemail messages delivered via email, the choice of codec is of crucial importance. In fact, with the advent of broadband Internet connectivity, the compatibility of the message format with the playback platform is far more important in practice, than the need to minimize the size of the data itself.

In the case of VoIP telephony, typically all calls are made using a 64 kbps uLaw encoding, in common with standard digital telephone service. Since today a high proportion of VoIP calls actually terminate at one end within the Public Switched Telephone Network (PSTN), the use of uLaw removes the requirement for codec conversions end-to-end; furthermore, since there is a desire to minimize processing on the voicemail server, simple, low-compression, codecs, such as uLaw are generally preferable to other high-compression codecs, such as Mp3. But as time has passed and computer systems have got faster, these trade-offs have become less important; it is much more important to encode the message in a format friendly to the common playback applications.

There are three predominant playback applications: Windows Media Player, QuickTime and the RealPlayer, so any format chosen for audio attachments should preferably be playable by all these platforms. This has led to a focus on two formats: PCM audio (in wav files) and MP3, the ubiquitous digital music format. Both these formats are playable by the standard applications without special downloads, furthermore, because these formats are cross-platform, users can forward messages to others, without worrying about playback formats.

Since voicemail messages are mono-aural in character, the use of PCM encoding for incoming calls results in a data rate of at least 480 kbytes/min, which is a lot of data, even at broadband rates. Therefore, MP3, or its successor, will present a better choice as the standard format because it can deliver messages at one half to one fourth the bit rate, with little loss of fidelity. Proprietary formats are unlikely to prevail, because they limit the audience for the message.

Format and Presentation of email messages: If the message is to be delivered to a public email address (such as hotmail or yahoo! mail), then the message must be formatted in a manner which is understood by all Internet email systems. Luckily a great deal of work has been done by the industry in this area and many standards exist concerned with the formatting of email messages and their attachments. The most important industry standard in this regard, is RFC 822, which specifies the basic format of Internet email messages and allows messages to be equipped with standard headers (such as From, To and Subject lines). RFC 822 also provides for the division of messages into multiple sections, such as a textual body together with an audio attachment. In modern practice each email has sections which are specified within the RFC822 structure, as belonging to different MIME types. A MIME-header on each section of a message specifies, at least, the encoding of the data within that section, and therefore the email client program can figure out how to marshal the data and to render or

play it back to the user. For example, an MP3 audio attachment would have a MIME type audio/MP3, and therefore the email program would know to invoke the MP3 playback application, registered for that MIME-type, on the user's computer. There is only one complication - email messages are always delivered as 7-bit ASCII text, and therefore any binary data (for example an audio attachment), must be translated into 7-bit ASCII as the attachment is encoded and translated back into binary by the receiving program. The 7-bit encoding scheme used is specified in the MIME header and the standard method is called Base64. Base64 results in a near doubling of the binary data size, and therefore this typically has the effect of doubling the data delivered to end-user. But, in a broadband world, nobody cares about this much anymore.

Aside from the audio attachment itself, the main body, from and subject fields are of great relevance to the delivery of voicemail by email. In the simplest situation, the from and subject lines provide no specific information about the message itself, and the user must listen to the message to find out who it is from etc. But, since the voicemail system capturing the message is attached to the phone system, it is often possible to use such telephone features as caller-id, to populate the from and subject fields with meaningful data. It is much better to get a voicemail via email with the caller's phone number displayed in the subject line (e.g. 425-555-1212), than to have every message delivered with a fixed subject line (e.g. Voicemail Message). Lastly, the body of the encapsulating email message is commonly delivered as simple text (such as Vonage), or in more sophisticated systems, as an HTML page, which may include graphics or playback buttons. Indeed, in some systems, the message itself is not delivered as an attachment at all and by clicking on the playback button, the user initiates real-time streaming of the message from a multimedia server on the provider's network.

Towards the Universal Mailbox: Market Research shows that receiving voicemail via email has a great deal of appeal to users. Not only can the user keep a copy of all their important messages, and manipulate and organize their voicemail within their email environment, but being email, messages can be forwarded, copied and otherwise manipulated just like any other email message. Furthermore, the use of the MP3 format, for example, means that messages can be treated just like music and manipulated in the same way.

Nevertheless, the provision of email forwarding within a public voicemail system, presents a number of usability challenges. First and foremost, the provision of the forwarding feature is limited in most current implementations to only one of the user's phone numbers. Since most users have multiple phone numbers (e.g. home, office and cellular), the provision of forwarding on only one of their numbers means that there is little or no saving in time or ease of use across the user's full suite of numbers.

Having to be at a computer to get their voicemail, on one line out of three, can be downright annoying. Furthermore, the lack of features, such as caller ID, in most public, voicemail systems, weakens the usability of the feature substantially.

What the users really want is a system which captures and forwards all their phone messages, independent of provider, allowing email to be used as the interface to all their voicemail. One approach to solving this problem is to anticipate that eventually all voicemail systems will provide email forwarding and to work to develop standards which will allow voicemails forwarded from different vendors systems, to have a common format. The most well-known of these initiatives is the so-called VPIM (Voice Profile for Internet Messaging) standard, which seeks to define the exact format of a complete email message. VPIM bolts down the exact formats of the from, subject and body sections of each email, as well as exact codecs and encoding methods to be used for the message itself. Although some vendors have made headway in implementing a common backend system, which can interface with many different voicemail systems on the backend, the deployment of compatible systems across multiple carriers and is fraught with difficulties, not least the fact that all the public telephone providers are in competition with each other and therefore there is little business incentive to build co-operating systems. Even if they wanted to, the capital costs and deployment cycles associated with the delivery of complex new features, such as email forwarding, mean that the industry moves at a snail's pace.

Summary: The advent of the Internet and the emergence of standardized interoperability between email systems and media players, means that it is now possible to provide voicemail to email forwarding as a standard feature of VoIP telephone services. This is the first time that such features have been available to end-users in a non-proprietary environment and the bundling and future evolution of such features is seen as crucial to the future of VoIP in particular and telephony in general.

The advent of ubiquitous broadband communications has removed many of the barriers to the implementation of fast, easy to use, high fidelity, audio applications. In addition, the store and forward character of voicemail delivery makes it an ideal Internet application because the playback of messages takes place locally, after the message has been downloaded, thereby guaranteeing a consistent audio experience.

Nevertheless, many challenges remain: most importantly, until email forwarding becomes widespread, it will remain a checkbox item, rather than a key feature of voicemail in general. But, the most common approach to unifying multiple voicemail systems, is to strive for interoperability on the backend. Although such integration is technically simple, it is a hard task to get such systems deployed, for good business reasons.

Martin Dunsmuir, Founder, President and CTO of GotVoice, Inc. Dunsmuir has held senior technical positions with industry-leading companies in the U.S. and abroad. His diverse background includes more than 25 years in technical and business development positions with Logica PLC, Microsoft, and RealNetworks. Dunsmuir can be contacted at martind@gotvoice.com or 425-828-0472. Visit www.gotvoice.com for more information.

GotVoice brings Internet access and email flexibility to voicemail

In our world of ubiquitous communication, we are faced with a number of isolated voice and data communications media from different service providers, each with its own navigation to retrieve and transmit messages. GotVoice is helping to build a world where users will have at their control a virtual message center, where all communications media are accessible to the user on the road, at the office, and at home. Today, email as well as residential, office, and cellular voicemail must all be individually monitored for time-critical messages. But unlike email, voicemail must be accessed in a serial manner without the benefit of prioritization or filtering.

GotVoice's patent pending technology moves us toward this "Virtual Message Center" by enabling the key features now available in email in an integrated email and voicemail experience. Messages from multiple accounts – office voicemail, cellular voicemail, residential voicemail, and even home answering machines – can all be consolidated into a single voicemail box, forwarded from one voice mailbox to another or forwarded to an email account

At a more concrete level, checking multiple voicemail accounts manually is cumbersome, time-consuming, and error-prone. GotVoice products let users: retrieve their voicemail from any source: residential, office or mobile phone; consolidate all voicemail to a single account; and access their voicemail within their email or on our web page. We move the email paradigm to voicemail by allowing the user to visually manage voicemail as one does email, by prioritizing messages using caller ID, and listening to those messages with a single mouse click. Users can forward messages to colleagues, save those of import and reply when necessary.

The GotVoice service is available at www.gotvoice.com and today serves subscribers of all tier 1 carriers in the 50 largest metro areas in the United States. The service is also available for integration into email and carrier networks.