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High-Level Requirements for Internet Voice Mail

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Abstract

This document describes the high-level requirements for Internet Voice Mail (IVM) and establishes a baseline of desired functionality against which proposed MIME profiles for Internet Voice Messaging can be judged. IVM is an extension of the Voice Profile for Internet Mail (VPIM) version 2 designed to support interoperability with desktop clients. Other goals for this version of VPIM include expanded interoperability with unified messaging systems, conformance to Internet standards, and backward compatibility with voice messaging systems currently running in a VPIM enabled environment. This document does not include goals that were met fully by VPIM version 2.

1. Introduction

Until recently, voice mail and call answering services were implemented as stand-alone proprietary systems. Today, standards such as the Voice Profile for Internet Mail (VPIM) enable interoperability between such systems over the Internet. VPIM version 1 [VPIM1] was experimental and was a first attempt at a Voice Profile for Internet Mail, but is now classified as Historical. VPIM Version 2 [VPIM2] is an improvement on VPIM version 1 that was originally intended to provide interoperability between voice messaging systems only. It describes a messaging profile that standardizes the exchange of voice mail over an IP messaging network using SMTP [DRUMSMTP] and MIME [MIME1].

Because the number of desktop boxes is growing rapidly and will soon approach the number of desktop telephones, it is essential to consider the requirements of desktop email client applications

(including, but not limited to, MIME-compliant email clients). With the trend toward integration of voice mail and email through unified messaging (UM), it is now necessary to define a profile that supports the needs of desktop applications and unified messaging systems (including Internet Facsimile [EXFAX]). This profile is being referred to as Internet Voice Mail (IVM).

This document defines the goals for Internet Voice Mail. This standard will support the interchange of voice messages between voice mail systems, unified messaging systems, email servers, and desktop client applications. The desktop client application is of particular and important interest to IVM. This document will also expand the offerings of service providers by facilitating access to voice mail from a web client.

2. Conventions used in this document

The following terms have specific meaning in this document:

"service"	An operational service offered by a service provider
"application"	A use of systems to perform a particular function
"terminal"	The endpoint of a communication application
"goal"	An objective of the standardization process

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14, RFC 2119 [RFC2119].

3. Goals for Internet Voice Mail

3.1. Interoperability

Enhanced interoperability is the primary goal of IVM. The profile MUST facilitate interoperability between voice mail systems, unified messaging systems, Internet email servers, and desktop client applications. Such interoperability MUST support systems which combine multiple media types in a single message, as well as legacy voice mail and email systems. It MUST allow the ability to accommodate varying capabilities of the voice mail, unified messaging, and email systems. Furthermore, IVM MUST be compatible with Internet Fax (extended mode) proposed standards and VPIM messages that contain fax body parts.

To have "interoperability" means that an IVM compliant sender attempting to send to a recipient will not fail because of incompatibility. IVM MUST support interoperability amongst the systems listed below:

- Desktop Email client applications
- IVM-capable Voice Mail systems
- IVM-capable unified messaging systems
- Traditional email servers

IVM SHOULD also support interoperability with VPIM version 2 Voice Mail Systems.

IVM MUST include new functionality to facilitate access to voice mail messages from desktop applications.

Overall interoperability requires interoperability for all message elements: body parts deemed essential for message validity MUST be preserved, essential information MUST be provided in a form that is accessible by the users, status codes [CODES] MUST be understood, and operations that are standard for each system SHOULD be supported.

3.1.1. Interoperability with Desktop Email Client Applications

Desktop email applications are typically text based. The abilities to listen to, reply to, forward, and generate voice mail messages from a traditional desktop environment are relatively new developments. To accommodate current use and future developments in this area, IVM MUST provide features to support access to voice mail messages from the desktop and other email-reading devices. Also, web access to voicemail SHOULD be supported from the desktop.

IVM SHOULD NOT require desktop email applications to possess a large amount of processing power, and a base level implementation MUST interoperate, even if it does not offer complex processing. In order to support interoperability, at least one mandatory codec MUST be defined. The mandatory codec(s) SHOULD be widely available on desktops. For interoperability with VPIM version 2 systems, IVM applications MAY also support the VPIM v2 mandatory codec, 32KADPCM [ADPCM and G726-32].

Any codecs included in the IVM specification SHOULD meet the following criteria:

- Availability on desktops: Codecs SHOULD be available on most platforms.

- Source code availability: Source code SHOULD be readily accessible.

- Decoding complexity: All codecs MUST be low complexity to decode.

- Encoding complexity: Some of the codecs MUST be low complexity to encode.

- Bit rate: IVM SHOULD specify a codec with low bit rate for devices (i.e., wireless) that do not have much space/bandwidth.

- Voice Over IP support: IVM SHOULD specify a codec that supports Voice over IP implementations.

Voice Content MUST always be contained in an audio/basic content-type unless the originator is aware that the recipient can handle other content. To enable future support of other formats, IVM SHOULD provide identification of the codec used without requiring interpretation of an audio format. IVM MAY allow audio encodings and formats that are not identified in the IVM specification to support environments in which the sender is aware of the optimal encoding and format for the recipient.

To address performance and bandwidth issues, IVM MAY support streaming of IVM audio to the desktop. IVM MAY explicitly support formats other than raw audio to facilitate streaming.

Because most email readers are text/html based and because many devices are not capable of recording audio content, IVM MUST allow inclusion of text body parts in a voice message. IVM SHOULD NOT explicitly prohibit other media types as long as critical content is identified and minimal discard rules are specified.

To support devices that have applications dedicated to specific media types or that are not capable of handling specific content, IVM SHOULD define a way to describe the content of the message, indicating how the content can be accessed.

Desktop implementation of IVM MUST support attachments of any media type.

3.1.2. Interoperability with IVM-capable Voice Messaging Systems

Voice messaging systems are generally implemented as special-purpose machines that interface to a telephone switch and provide call answering and voice messaging services. VPIM version 2 was designed to support interoperability between such systems and remains the best messaging profile for this purpose.

To support interoperability between IVM voice messaging systems and other compliant systems, IVM SHOULD have a minimum set of required features that will guarantee interoperability, and also provision for additional functionality that may be supported by more complex systems. IVM MUST define a mechanism for identifying essential content and status codes [CODES] indicating that a message could not be delivered due to capability differences.

NOTE: IVM SHOULD provide some level of interoperability with VPIM version 2 voice messaging systems. In order to support minimal interoperability between IVM and VPIM version 2, IVM systems MAY be able to receive the VPIM version 2 32KADPCM codec [ADPCM and G726-32], and MUST gracefully handle the case where a legacy receiving system does not support the IVM codecs.

3.1.3. Interoperability with IVM-capable Unified Messaging Systems

Unified messaging solutions typically leverage common store, directory, and transport layers to provide greater interoperability and accessibility to a variety of media content. They support creation of and access to voicemail, email, and fax messages from a single user interface.

To accommodate the common functionality of unified messaging systems, IVM MUST support the inclusion of body parts containing different media types. It MUST also handle messages that contain VPIM messages as attachments to messages of another type (such as multipart/mixed), and VPIM messages that contain attachments of another type.

To provide interoperability with systems that cannot handle a particular content type, IVM MUST provide a mechanism for identifying critical content and MAY define media specific status codes and strings to handle non-delivery of these body parts.

3.1.4. Interoperability with Traditional Email Servers

Traditional email servers are those that support only textual media as inline content. IVM MUST interoperate consistently with the current Internet mail environment. If an IVM message arrives in users' mailboxes, IVM MUST provide a mechanism to interoperate with common user practices for mail messages: storing them in databases, retransmission, forwarding, creation of mail digests, and replying to messages using non-audio equipment.

3.2. Conformance to Existing Standards

It is the goal of IVM to conform as closely as possible to existing standards while meeting the other goals defined in this document.

- Restrictions: The profile SHOULD impose as few restrictions as possible to existing Internet mail standards. In particular, it MUST support all elements of RFC 2822 [DRUMSIMF], except those that prevent the profile from meeting other IVM goals.

- Additions: The profile SHOULD make as few additions as possible to existing internet mail standards. It SHOULD adhere to existing desktop conventions in desktop-related areas such as file extensions. If it is necessary to define new MIME types or sub-types, the IVM work group SHOULD propose terms that are already standard or in common use in the desktop environment.

3.3. Backward Compatibility

This profile SHOULD provide backward compatibility with VPIM version 2 to the extent that the functionality required to meet the goals of this profile is not compromised. Where backward compatibility is not possible, IVM SHOULD provide and define a minimal set of rules and status codes for handling non-delivery of IVM messages resulting from interoperability with VPIM version 2 systems and other legacy systems.

3.4. Robustness

IVM MUST be usable in an environment in which there exist legacy gateways that do not understand MIME. Core features and critical data MUST not be lost when messages pass through AMIS gateways [AMIS-A and AMIS-D]. IVM SHOULD allow interoperability with recipient devices and gateways that have limited buffering capabilities and cannot buffer all header information.

3.5. Security Considerations

To facilitate security, IVM MUST support authenticated and/or encrypted voice messages. In addition, IVM MUST adhere to the security issues identified in VPIM v2 [VPIM2] and in the other RFCs referenced by this document, especially SMTP [DRUMSMTP], Internet Message Format [DRUMSIMF], and MIME [MIME1].

4. References

4.1. Normative References

[ADPCM] Vaudreuil, G. and G. Parsons, "Toll Quality Voice - 32 kbit/s ADPCM: MIME Sub-type Registration", RFC 2422, September 1998.

[AMIS-A] Audio Messaging Interchange Specifications (AMIS) - Analog Protocol Version 1, Issue 2, February 1992.

[AMIS-D] Audio Messaging Interchange Specifications (AMIS) - Digital Protocol Version 1, Issue 3 August 1993.

[CODES] Vaudreuil, G., "Enhanced Mail System Status Codes", RFC 3463, January 2003.

[DRUMSMTP] Klensin, J., "Simple Mail Transfer Protocol", RFC 2821, April 2001.

[DRUMSIMF] Resnick, P., "Internet Message Format", RFC 2822, April 2001.

[EXFAX] Masinter, L. and D. Wing, "Extended Facsimile Using Internet Mail", RFC 2532, March 1999.

[G726-32] CCITT Recommendation G.726 (1990), General Aspects of Digital Transmission Systems, Terminal Equipment - 40, 32,24,16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM).

[MIME1] Freed, N. and N. Borenstein, "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies", RFC 2045, November 1996.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[VPIM2] Vaudreuil, G. and G. Parsons, "Voice Profile for Internet Mail, Version 2", RFC 2421, September 1998.

4.2. Informative References

[VPIM1] Vaudreuil, Greg, "Voice Profile for Internet Mail", RFC 1911, February 1996.

[VPIM3] Silvestro, L. and R. Miles, "Goals for Voice Profile for Internet Mail, Version 3", Work in Progress, March 2000.

5. Acknowledgments

This document is the final result of an evolving requirements document that started with VPIM v3 and evolved into an alternative specification for a different (i.e., end-to-end instead of server-to-server) application. The basis for this document was written by Laile Di Silvestro and Rod Miles [VPIM3].

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