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Voice Profile for Internet Mail - version 2 (VPIMv2)

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Abstract

This document specifies a restricted profile of the Internet multimedia messaging protocols for use between voice processing server platforms. The profile is referred to as the Voice Profile for Internet Mail (VPIM) in this document. These platforms have historically been special-purpose computers and often do not have the same facilities normally associated with a traditional Internet Email-capable computer. As a result, VPIM also specifies additional functionality, as it is needed. This profile is intended to specify the minimum common set of features to allow interworking between conforming systems.

This document obsoletes RFC 2421 and describes version 2 of the profile with greater precision. No protocol changes were made in this revision. A list of changes from RFC 2421 are noted in Appendix F. Appendix A summarizes the protocol profiles of this version of VPIM.

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1. Introduction

MIME is the Internet multipurpose, multimedia-messaging standard. This document explicitly recognizes its capabilities and provides a mechanism for the exchange of various messaging technologies, primarily voice and facsimile.

Voice messaging evolved as telephone answering service into a full send, receive, and forward messaging paradigm with unique message features, semantics and usage patterns. Voice messaging was introduced on special purpose computers that interface to a telephone switch and provide call answering and voice messaging services. Traditionally, messages sent from one voice messaging system to another were transported using analog networking protocols based on DTMF signaling and analog voice playback. As the demand for networking increases, there was a need for a standard high-quality digital protocol to connect these machines. VPIM has successfully demonstrated its usefulness as this new standard. VPIM is widely implemented and is seeing deployment in customer networks. This document clarifies ambiguities found in the earlier specification and is consistent with implementation practice. The profile is referred to as Voice Profile for Internet Mail (VPIM) in this document.

This document specifies a restricted profile of the Internet multimedia messaging protocols for use between voice processing server platforms. These platforms have historically been special-purpose computers and often do not have the same facilities normally associated with a traditional Internet Email-capable computer. As a result, VPIM also specifies additional functionality, as it is needed. This profile is intended to specify the minimum common set of features to allow interworking between conforming systems.

This document obsoletes RFC 2421 and describes VPIM version 2 of with greater precision. No protocol changes were made in this revision. A list of changes from RFC 2421 are noted in Appendix F. Appendix A summarizes the protocol profiles of this version of VPIM.

1.1. Voice Messaging System Limitations

The following are typical limitations of voice messaging platforms that were considered in creating this baseline profile.

1) Text messages are not normally received and often cannot be easily displayed or viewed. They can often be processed only via text-to-speech or text-to-fax features not currently present in many of these machines.

2) Voice mail machines usually act as an integrated Message Transfer Agent, Message Store and User Agent. There is typically no relaying of messages. RFC822 header fields may have limited use in the context of the limited messaging features currently deployed.

3) Voice mail message stores are generally not capable of preserving the full semantics of an Internet message. As such, use of a voice mail machine for gatewaying is not supported. In particular, storage of recipient lists, "Received:" lines, and "Message-ID:" may be limited.

4) Internet-style distribution/exploder mailing lists are not typically supported. Voice mail machines often implement only local alias lists, with error-to-sender and reply-to-sender behavior. Reply-all capabilities using a Cc list are not generally available.

5) Error reports must be machine-parsable so that helpful responses can be voiced to users whose only access mechanism is a telephone.

6) The voice mail systems generally limit address entry to 16 or fewer numeric characters, and normally do not support alphanumeric mailbox names. Alpha characters are not generally used for mailbox identification, as they cannot be easily entered from a telephone terminal.

It should be noted that newer systems are based natively on SMTP/MIME and do not suffer these limitations. In particular, some systems may support media other than voice and fax.

1.2. Design Goals

It is a goal of this profile to make as few restrictions and additions to the existing Internet mail protocols as possible while satisfying the requirements for interoperability with current generation voice messaging systems. This goal is motivated by the desire to increase the accessibility to digital messaging by enabling the use of proven existing networking software for rapid development.

This specification is intended for use on a TCP/IP network; however, it is possible to use the SMTP protocol suite over other transport protocols. The necessary protocol parameters for such use are outside the scope of this document.

This profile is intended to be robust enough to be used in an environment, such as the global Internet, with installed-base gateways that do not understand MIME. Full functionality, such as reliable error messages and binary transport, will require careful selection of gateways (e.g., via MX records) to be used as VPIM forwarding agents. Nothing in this document precludes use of general-purpose MIME email packages to read and compose VPIM messages. While no special configuration is required to receive VPIM conforming messages, some may be required to originate conforming structures.

It is expected that a system administrator who can perform TCP/IP network configuration will manage a VPIM messaging system. When using facsimile or multiple voice encodings, it is suggested that the system administrator maintain a list of the capabilities of the networked mail machines to reduce the sending of undeliverable messages due to lack of feature support. Configuration, implementation and management of these directory-listing capabilities are local matters.

1.3. Applicability for VPIM

VPIM is intended for the exchange of voice messages between traditional voice messaging systems and for systems that need to interoperate with such systems. VPIM is intended connect voice-messaging systems into special-purpose voice messaging networks. VPIM may also be used between message store servers and VPIM-aware clients such as web servers, TUI, and GUI clients. VPIM is not intended or optimized for downloading to, or sending from commercial email clients.

Internet Voice Messaging, the subject of a separate standards initiative, is intended to enable general-purpose email clients to send and receive voice content through general-purpose message stores in an interoperable way. IVM may also be a suitable format for downloading voice messages from a VPIM server to a commercial email client. It may also be a suitable format for submission of a voice message from a general-purpose client into a VPIM system.

2. Requirements Language

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 [REQ].

3. Protocol Restrictions

This protocol does not limit the number of recipients per message. Where possible, server implementations should not restrict the number of recipients in a single message. It is recognized that no implementation supports unlimited recipients, and that the number of supported recipients may be quite low.

This protocol does not limit the maximum message length. Implementers should understand that some machines will be unable to accept excessively long messages. A mechanism is defined in [SIZE] to declare the maximum message size supported.

The following sections describe the restrictions and additions to Internet mail protocols that are required to be conforming with this VPIM v2 profile. Though various SMTP, ESMTP and MIME features are described here, the implementer is referred to the relevant RFCs for complete details. The table in Appendix A summarizes the protocol details of this profile.

4. Voice Message Interchange Format

The voice message interchange format is a profile of the Internet Mail Protocol Suite. Any Internet Mail message containing the format defined in this section is referred to as a VPIM Message in this document. As a result, this document assumes an understanding of the Internet Mail specifications. Specifically, VPIM references components from the message format standard for Internet messages [RFC822], the Multipurpose Internet Message Extensions [MIME1-5], the X.400 gateway specification [X.400], and the delivery status and message disposition notifications [REPORT][DSN][DRPT][STATUS][MDN].

MIME, introduced in [MIME1], is a general-purpose message body format that is extensible to carry a wide range of body parts. It provides for encoding binary data so that it can be transported over the 7-bit text-oriented SMTP protocol. This transport encoding (denoted by the "Content-Transfer-Encoding:" MIME field) is in addition to the audio encoding required to generate a binary object.

MIME defines two transport-encoding mechanisms to transform binary data into a 7-bit representation, one designed for text-like data ("Quoted-Printable"), and one for arbitrary binary data ("Base64"). While Base64 is dramatically more efficient for audio data, either will work. Where binary transport is available, no transport encoding is needed, and the data can be labeled as "Binary".

4.1. VPIM Message Addressing Formats

VPIM addresses SHALL use the RFC 822 format based on the Domain Name System. This naming system has two components: the local part, used for username or mailbox identification; and the host part, used for global machine identification.

4.1.1. VPIM Addresses

The local part of the address shall be a US-ASCII string uniquely identifying a mailbox on a destination system. For voice messaging, the local part SHALL be a printable string containing the mailbox ID of the originator or recipient. While alpha characters and long mailbox identifiers MAY be permitted, short numeric local parts SHOULD be used as most voice mail networks rely on numeric mailbox identifiers to retain compatibility with the limited 10-digit telephone keypad. As a result, some voice messaging systems may only be able to handle a numeric local part. The reception of alphanumeric local parts on these systems may result in the address being mapped to some locally unique (but confusing to the recipient) number or, in the worst case the address could be deleted making the message unreplyable. Additionally, it may be difficult to create messages on these systems with an alphanumeric local part without complex key sequences or some form of directory lookup (see 6). The use of the Domain Name System should be transparent to the user. It is the responsibility of the voice mail machine to lookup the fully-qualified domain name (FQDN) based on the address entered by the user (see 6).

In the absence of a global directory, specification of the local part is expected to conform to international or private telephone numbering plans. It is likely that private numbering plans will prevail and these are left for local definition. However, it is RECOMMENDED that public telephone numbers be noted according to the international numbering plan described in [E.164]. The indication that the local part is a public telephone number is given by a preceding "+" (the "+" would not be entered from a telephone keypad, it is added by the system as a flag). Since the primary information in the numeric scheme is contained by the digits, other character separators (e.g., "-") may be ignored (i.e., to allow parsing of the numeric local mailbox) or may be used to recognize distinct portions of the telephone number (e.g., country code). The specification of the local part of a VPIM address can be split into the four groups described below:

1) mailbox number
   - for use as a private numbering plan (any number of digits)
   - e.g., 2722@lucent.com

2) mailbox number+extension
- for use as a private numbering plan with extensions any number of digits, use of "+" as separator
- e.g., 2722+111@Lucent.com

3) +international number
- for international telephone numbers conforming to E.164 maximum of 15 digits
- e.g., +16137637582@vm.nortel.ca

4) +international number+extension
- for international telephone numbers conforming to E.164 maximum of 15 digits, with an extension (e.g., behind a PBX) that has a maximum of 15 digits.
- e.g., +17035245550+230@ema.org

Note that this address format is designed to be compatible with current usage within the voice messaging industry. It is not compatible with the addressing formats of RFCs 2303-2304. It is expected that as telephony services become more widespread on the Internet, these addressing formats will converge.

4.1.2. Special Addresses

Special addresses to represent the sender are provided for compatibility with the conventions of Internet mail. These addresses do not use numeric local addresses, both to conform to current Internet practice and to avoid conflict with existing numeric addressing plans. Two special addresses are RESERVED for use as follows:

postmaster@domain

By convention, a special mailbox named "postmaster" MUST exist on all systems. This address is used for diagnostics and should be checked regularly by the system manager. This mailbox is particularly likely to receive text messages, which is not normal on a voice-processing platform. The specific handling of these messages is an individual implementation choice.

non-mail-user@domain

If a reply to a message is not possible, such as a telephone-answering message, then the special address "non-mail-user" SHOULD be used as the originator's address. Any text name such as "Telephone Answering", or the telephone number if it is available, is permitted. This special address is used as a token to indicate an unreachable originator. A conforming implementation MUST NOT permit a reply to an

address from "non-mail-user". For compatibility with the installed base of mail user agents, implementations MUST reject the message when a message addressed to "non-mail-user" is received. The status code for such NDN's is 5.1.1 "Mailbox does not exist".

Example:

From: Telephone Answering <non-mail-user@mycompany.com>

4.1.3. Distribution Lists

There are many ways to handle distribution list (DL) expansions and none are 'standard'. A VPIM implementation MAY support DLs. Using a simple alias is a behavior closest to what many voice mail systems do today and what is to be used with VPIM messages. A couple of important features that need special care when DLs are used are:

Reply to the originator - (Address in the RFC822 "Reply-To:" or "From" field)
Errors to the submitter - (Address in the MAIL FROM field of the ESMTP exchange or the "Return-Path:" RFC822 field)

Some proprietary voice messaging protocols include only the recipient of the particular copy in the envelope and include no "header fields" except date and per-message features. Most voice messaging systems do not provide for "Header Information" in their messaging queues and only include delivery information. As a result, recipient information MAY be in either the "To:" or "Cc:" header fields. If all recipients cannot be presented then the recipient header fields SHOULD be omitted to indicate that an accurate list of recipients (e.g., for use with a reply-all capability) is not known.

4.2. Message Header Fields

Internet messages contain a header information block. This header block contains information required to identify the sender, the list of recipients, the message send time, and other information intended for user presentation. Except for specialized gateway and mailing list cases, header fields do not indicate delivery options for the transport of messages.

Distribution list processors are noted for modifying or adding to the header fields of messages that pass through them. VPIM systems MUST be able to accept and ignore header fields that are not defined here.

The following header lines are permitted for use with VPIM messages:

4.2.1. From

SEND RULES

The originator's fully qualified domain address (a mailbox address followed by the fully qualified domain name) MUST be present. Systems conforming with this profile SHOULD provide the text personal name of the voice message originator in a quoted phrase, if the name is available. Text names of corporate or positional mailboxes MAY be provided as a simple string. From: [RFC822]

Example:

From: "Joe S. User" <12145551212@mycompany.com>

From: Technical Support <611@serviceprovider.com>

From: Non-mail-user@myserver.mycompany.com

Voice mail machines may not be able to support separate attributes for the "From:" header fields and the SMTP MAIL FROM, VPIM-conforming systems SHOULD set these values to the same address. Use of addresses different than those present in the "From:" header field address may result in unanticipated behavior.

RECEIVE RULES

The user listed in the "From:" field MUST be presented in the voice message envelope of the voice messaging system as the originator of the message, though the exact presentation is an implementation decision (e.g., the mailbox ID or the text name MAY be presented). The "From:" address SHOULD be used for replies (see 4.9).

4.2.2. To

The "To:" field contains the recipient's fully-qualified domain address.

Example:

To: +12145551213@mycompany.com

SEND RULES

There MAY be one or more "To:" fields in any message. Systems SHOULD provide a list of recipients only if all recipients are available.

Systems, such as gateways from protocols or legacy platforms that do not indicate the complete list of recipients, MAY provide a "To:" line. Because these systems cannot accurately enumerate all recipients in the "To:" headers, recipients SHOULD NOT be enumerated.

RECEIVE RULES

Systems conforming to this profile MAY discard the addresses in the "To:" fields if they are unable to store the information. This would, of course, make a reply-to-all capability impossible. If present, the addresses in the "To:" field MAY be used for a reply message to all recipients.

4.2.3. Cc

The "Cc:" field contains additional recipients' fully qualified domain addresses. Many voice mail systems maintain only sufficient envelope information for message delivery and are not capable of storing or providing a complete list of additional recipients.

SEND RULES

Conforming implementations MAY send "Cc:" lists if all recipients are known at the time of origination. If not, systems SHOULD omit the "Cc:" fields to indicate that the full list of recipients is unknown or otherwise unavailable. The list of disclosed recipients MUST NOT include undisclosed recipients (i.e., those sent via a blind copy).

Example:

```
Cc: +12145551213@mycompany.com
```

RECEIVE RULES

Systems conforming to this profile MAY add all the addresses in the "Cc:" field to the "To:" field, others MAY discard the addresses in the "Cc:" fields. If a list of "Cc:" addresses is present, these addresses MAY be used for a reply message to all recipients.

4.2.4. Date

The "Date:" field contains the date and time the message was sent by the originator.

SEND RULES

The sending system MUST report the time the message was sent. The time zone MUST be present and SHOULD be represented in a four-digit

time zone offset, such as -0500 for North American Eastern Standard Time. This MAY be supplemented by a time zone name in parentheses, e.g., "-0700 (PDT)".

Example:

Date: Wed, 28 Jul 96 10:08:49 -0800 (PST)

If the VPIM sender is relaying a message from a system that does not provide a time stamp, the time of arrival at the gateway system SHOULD be used as the date.

RECEIVE RULES

Conforming implementations SHOULD be able to convert [RFC822] date and time stamps into local time

4.2.5. Sender

The "Sender:" field contains the actual address of the originator if an agent on behalf of the author indicated in the "From:" field sends the message.

SEND RULES

This header field MAY be sent by VPIM-conforming systems.

RECEIVE RULES

If the address in the "Sender:" field cannot be preserved in the recipient's message queues or in the next-hop protocol from a gateway, the field MAY be silently discarded.

4.2.6. Return-Path

The "Return-path:" field is added by the final delivering SMTP server. If present, it contains the address from the MAIL FROM parameter of the ESMTP exchange (see [RFC822]). Any error messages resulting from the delivery failure MUST be sent to this address. Note that if the "Return-path:" is null ("<>") (e.g., a call answer message would have no return path) delivery status notifications MUST NOT be sent.

SEND RULES

The originating system MUST NOT add this header.

RECEIVE RULES

If the receiving system is incapable of storing the return path (or MAIL FROM) to be used for subsequent delivery errors (i.e., it is a gateway to a legacy system or protocol), the receiving system must otherwise ensure that further delivery errors don't happen. Systems that do not support the return path MUST ensure that at the time the message is acknowledged (i.e., when a DSN would be sent), the message is delivered to the recipient's ultimate mailbox. Non-Delivery notifications SHOULD NOT be sent after that final delivery.

4.2.7. Message-id

The "Message-Id:" field contains a globally unique per-message identifier.

SEND RULES

A globally unique message-id MUST be generated for each message sent from a VPIM-conforming implementation.

Example:

```
Message-Id: <12345678@mycompany.com>
```

RECEIVE RULES

When provided in the original message, it MUST be used when sending a MDN. This identifier MAY be used for tracking and auditing. From [RFC822]

4.2.8. Reply-To

If present, the "Reply-To:" header provides a preferred address to which reply messages should be sent (see 4.9). Typically, voice mail systems can only support one originator of a message so it is likely that this field will be ignored by the receiving system. From: [RFC822]

SEND RULES

A conforming system SHOULD NOT send a "Reply-To:" header.

RECEIVE RULES

If a "Reply-To:" field is present, a reply-to-sender message MAY be sent to the address specified (that is, in lieu of the address in the "From:" field). If the receiving system (e.g., multi-protocol

gateway) only supports one address for the originator, then the address in the "From:" field MUST be used and the "Reply-To:" field MAY be silently discarded.

4.2.9. Received

The "Received:" field contains trace information added to the beginning of a RFC822 message by MTAs. This is the only field that may be added by an MTA. Information in this header is useful for debugging when using an US-ASCII message reader or a header-parsing tool. From: [RFC822]

SEND RULES

A VPIM-conforming system MUST add a "Received:" field. When acting as a gateway, information about the system from which the message was received SHOULD be included.

RECEIVE RULES

A VPIM-conforming system MUST NOT remove any "Received:" fields when relaying messages to other MTAs or gateways. These header fields MAY be ignored or deleted when the message is received at the final destination.

4.2.10. MIME Version

The "MIME-Version:" field MUST be present to indicate that the message conforms to [MIME1-5]. Systems conforming with this specification SHOULD include a comment with the words "(Voice 2.0)". [VPIM1] defines an earlier version of this profile and uses the token (Voice 1.0). Example:

```
MIME-Version: 1.0 (Voice 2.0)
```

This identifier is intended for information only and SHOULD NOT be used to semantically identify the message as being a VPIM message. Instead, the presence of the multipart/voice-message content type defined in section 18.2 SHOULD be used if identification is necessary.

4.2.11. Content-Type

The "Content-Type:" header MUST be present to declare the type of content enclosed in the message. The typical top-level content in a VPIM Message SHOULD be Multipart/Voice-Message. The allowable contents are detailed starting in section 4.4 of this document. From: [MIME2]

4.2.12. Content-Transfer-Encoding

Because Internet mail was initially specified to carry only 7-bit US-ASCII text, it may be necessary to encode voice and fax data into a representation suitable for that environment. The "Content-Transfer-Encoding:" header describes this transformation if it is needed.

SEND RULES

An implementation in conformance with this profile SHOULD send audio and/or facsimile data in "Binary" form when binary message transport is available (see section 5). When binary transport is not available, implementations MUST encode the audio and/or facsimile data as "Base64".

RECEIVE RULES

Conforming implementations MUST recognize and decode the standard encodings, "Binary" (when binary support is available), "7bit, "8bit", "Base64" and "Quoted-Printable" per [MIME1]. The detection and decoding of "Quoted-Printable", "7bit", and "8bit" MUST be supported in order to meet MIME requirements and to preserve interoperability with the fullest range of possible devices.

4.2.13. Sensitivity

The "Sensitivity:" field, if present, indicates the requested privacy level. If no privacy is requested, this field is omitted. The header definition is as follows:

Sensitivity := "Sensitivity" ":" Sensitivity-value

Sensitivity-value := "Personal" / "Private" / "Company-Confidential"

SEND RULES

A VPIM-conforming implementation MAY include this header to indicate the sensitivity of a message. If a user marks a message "Private", a conforming implementation MUST send only the "Private" sensitivity level. There are no VPIM-specific semantics defined for the values "Personal" or "Company-Confidential". A conforming implementation SHOULD NOT send the values "Personal" or "Company-Confidential". If the message is of "Normal" sensitivity, this field SHOULD be omitted. From: [X.400]

RECEIVE RULES

If a "Sensitivity:" field with a value of "Private" is present in the message, a conforming system MUST prohibit the recipient from forwarding this message to any other user. A conforming system, however, SHOULD allow the responder to reply to a sensitive message, but SHOULD NOT include the original message content. The responder MAY set the sensitivity of the reply message.

A receiving system MAY ignore sensitivity values of "Personal" and "Company Confidential".

If the receiving system does not support privacy and the sensitivity is "Private", a negative delivery status notification MUST be sent to the originator with the appropriate status code (5.6.0) "Other or undefined protocol status" indicating that privacy could not be assured. The message contents SHOULD be returned to the sender to allow for a voice context with the notification. A non-delivery notification to a private message SHOULD NOT be tagged private since it will be sent to the originator. From: [X.400]

A message with no privacy explicitly noted (i.e., no header) or with "Normal" sensitivity has no special treatment.

4.2.14. Importance

Indicates the requested importance to be given by the receiving system. If no special importance is requested, this header MAY be omitted and the value of the absent header assumed to be "normal". From: [X.400]

Importance := "Importance" ":" importance-value

Importance-value := "low" / "normal" / "high"

SEND RULES

Conforming implementations MAY include this header to indicate the importance of a message.

RECEIVE RULES

If the receiving system does not support "Importance:", the attribute MAY be silently dropped.

4.2.15. Subject

The "Subject:" field is often provided by email systems but is not widely supported on voice mail platforms. From: [RFC822]

SEND RULES

For compatibility with text-based mailbox interfaces, a text subject field SHOULD be generated by a conforming implementation. It is RECOMMENDED that voice-messaging systems that do not support any text user interfaces (e.g., access only by a telephone) insert a generic subject header of "VPIM Message" or "Voice Message" for the benefit of GUI-enabled recipients.

RECEIVE RULES

It is anticipated that many voice-only systems will be incapable of storing the subject line. The subject MAY be discarded by a receiving system.

4.3. MIME Audio Content Descriptions

4.3.1. Content-Description

This field MAY be present to facilitate the text identification of these body parts in simple email readers. Any values may be used.

Example:

```
Content-Description: Big Telco Voice Message
```

SEND RULES

This field MAY be added to a voice body part to offer a freeform description of the voice content. It is useful to incorporate the values for Content-Disposition with additional descriptions. For example, this can be used to indicate product name or transcoding records.

RECEIVE RULES

This field MAY be displayed to the recipient. However, since it is only informative it MAY be ignored.

4.3.2. Content-Disposition

This field MUST be present to allow the parsable identification of body parts within a VPIM voice message. This is especially useful if, as is typical, more than one Audio/* body occurs within a single level (e.g., Multipart/Voice-Message). Since a VPIM voice message is intended to be automatically played in the order in which the audio contents occur, the audio contents MUST always be of disposition inline. However, it is still useful to include a filename value, so this SHOULD be present if this information is available. From: [DISP]

SEND RULES

In order to distinguish between the various types of audio contents in a VPIM voice message a new disposition parameter "voice" is defined with IANA (see section 18.1) with the parameter values below to be used as appropriate:

Audio-Type := "voice" "=" Audio-type-value

Audio-type-value := "Voice-Message" / "Voice-Message-Notification" / "Originator-Spoken-Name" /"Recipient-Spoken-Name" /"Spoken-Subject"

- Voice-Message - the primary voice message,
- Voice-Message-Notification - a spoken delivery notification or spoken disposition notification,
- Originator-Spoken-Name - the spoken name of the originator,
- Recipient-Spoken-Name - the spoken name of the recipient(s) if available to the originator
- Spoken-Subject- the spoken subject of the message, typically spoken by the originator

Note that there SHOULD only be one instance of each of these types of audio contents per message level. Additional instances of a given type (i.e., parameter value) MAY occur within an attached forwarded or reply voice message. If there are multiple recipients for a given message, recipient-spoken-name MUST NOT be used.

RECEIVE RULES

Implementations SHOULD use this header. However, those that do not understand the "voice" parameter (or the "Content-Disposition:" header) can safely ignore it, and will present the audio body parts in order (but will not be able to distinguish between them). If more than one instance of the "voice" parameter type value is encountered at one level (e.g., multiple ’Voice-Message’ tagged contents) then they SHOULD be presented together.

4.3.3. Content-Duration

The "Content-Duration:" header provides an indication of the audio length in seconds of the segment.

Example:

```
Content-Duration: 33
```

SEND RULES

This field MAY be present to allow the specification of the length of the audio body part in seconds.

RECEIVE RULES

The use of this field on reception is a local implementation issue.
From: [DUR]

4.3.4. Content-Language:

This field MAY be present to allow the specification of the spoken language of the audio body part. The encoding is defined in [LANG].

Example for UK English:

```
Content-Language: en-UK
```

SEND RULES

A sending system MAY add this field to indicate the language of the voice. The determination of this (e.g., automated or user-selected) is a local implementation issue.

RECEIVE RULES

The use of this field on reception is a local implementation issue. It MAY be used as a hint to the recipient (e.g., end-user or an automated translation process) as to the language of the voice message.

4.4. Voice Message Content Types

The content types described in this section are identified for use within the Multipart/Voice-Message content. This content is referred to as a "VPIM message" in this document and is the fundamental part of a "VPIM message".

Only the contents profiled can be sent within a VPIM voice message construct (i.e., the Multipart/Voice-Message content type) to form a simple or a more complex structure (several examples are given in Appendix B). The presence of other contents within a VPIM voice message is not permitted. In the absence of a bilateral agreement, conforming implementations MUST NOT create a message containing prohibited contents. In the spirit of liberal acceptance, a conforming implementation MAY accept and render prohibited content. Systems unable to accept or render prohibited contents MAY discard the prohibited contents as necessary to deliver the acceptable content. When multiple contents are present within the Multipart/Voice-Message, they SHOULD be presented to the user in the order that they appear in the message.

Some deployed implementations based on a common interpretation of the original VPIM v2 specification reject messages with prohibited content rather than discard the unsupported contents. For interoperability with these systems, it is especially important that prohibited contents not be sent within a Multipart/Voice-Message.

4.4.1. Multipart/Voice-Message

This MIME multipart structure provides a mechanism for packaging a voice message into one container that is tagged as VPIM v2 conforming. The sub-type is identical in semantics and syntax to multipart/mixed, as defined in [MIME2]. As such, it may be safely interpreted as a multipart/mixed by systems that do not understand the sub-type (only the identification as a voice message would be lost).

In addition to the MIME required boundary parameter, a version parameter is also required for this sub-type. This is to distinguish this refinement of the sub-type from the previous definition in [VPIM1]. The value of the version parameter is "2.0" if the content conforms to the requirements of this specification. Should there be further revisions of this content type, there MUST be backwards compatibility (i.e., systems implementing version n can read version 2, and systems implementing version 2 can read version 2 contents within a version n).

SEND RULES

The Multipart/Voice-Message content-type MUST only contain the profiled media and content types specified in this section (i.e., Audio/*, Image/*, and Message/RFC822). The most common will be: spoken name, spoken subject, the message itself, and an attached fax. Forwarded messages are created by simply using the Message/RFC822 construct.

Conformant implementations MUST use Multipart/Voice-Message in a VPIM message. In most cases, this Multipart/Voice-Message Content-Type will be the top level but may be included within a Message/RFC822 if the message is forwarded or within a multipart/mixed when more than one message is being forwarded.

RECEIVE RULES

Conformant implementations MUST recognize the Multipart/Voice-Message content (whether it is a top-level content or contained in a Multipart/Mixed) and MUST be able to separate the contents (e.g., spoken name or spoken subject).

The semantic of Multipart/Voice-Message (defined in section 18.2) is identical to Multipart/Mixed and may be interpreted as that by systems that do not recognize this content-type.

4.4.2. Message/RFC822

SEND RULES

MIME requires support of the Message/RFC822 message encapsulation body part. This body part SHOULD be used within a Multipart/Voice-Message to forward complete messages (see 4.8) or to reply with original content (see 4.9). From: [MIME2]

RECEIVE RULES

The receiving system MUST accept this format and SHOULD treat this attachment as a forwarded message. The receiving system MAY flatten the forwarding structure (i.e., remove this construct to leave multiple voice contents or even concatenate the voice contents to fit in a recipient’s mailbox), if necessary.

4.4.3. Audio/32KADPCM

SEND RULES

An implementation conforming to this profile MUST send Audio/32KADPCM by default for voice [ADPCM]. This encoding is a moderately-compressed encoding with a data rate of 32 kbits/second using moderate processing resources. Typically, this body contains several minutes of message content; however, if used for spoken name or subject the content is expected to be considerably shorter (i.e., about 5 and 10 seconds respectively).

RECEIVE RULES

Receivers MUST be able to accept and decode Audio/32KADPCM. If an implementation can only handle one voice body, then multiple voice bodies (if present) SHOULD be concatenated, and MUST NOT be discarded. If concatenated, the contents SHOULD be in the same order they appeared in the multipart.

4.4.4. Image/TIFF

A common image encoding for facsimile, known as TIFF-F, is a derivative of the Tag Image File Format (TIFF) and is described in several documents. For the purposes of VPIM, the F Profile of TIFF for Facsimile (TIFF-F) is defined in [TIFF-F], and the Image/TIFF MIME content-type is defined in [TIFFREG]. While there are several formats of TIFF, only TIFF-F is profiled for use within Multipart/Voice-Message. Further, since the TIFF-F file format is used in a store-and-forward mode with VPIM, the image MUST be encoded so that there is only one image strip per facsimile page.

SEND RULES

All VPIM implementations that support facsimile MUST generate TIFF-F compatible facsimile contents in the Image/TIFF subtype using the application=faxbw encoding by default. If the VPIM message is a voice- annotated fax, the implementation SHOULD send this fax content in Multipart/Voice-Message. If the message is a simple fax, an implementation MAY send it without using the Multipart/Voice-Message to be more compatible with fax-only (RFC 2305) implementations.

While any valid MIME body header MAY be used (e.g., Content-Disposition to indicate the filename), none are specified to have special semantics for VPIM and MAY be ignored. Note that the content-type parameter application=faxbw MUST be included in outbound messages.

RECEIVE RULES

Not all VPIM systems support fax, but all SHOULD accept it within the multipart/voice-message. Within a Multipart/Voice-Message, a receiving system that cannot render fax content SHOULD accept the voice content of a VPIM message and discard the fax content. Outside a Multipart/Voice-Message, a recipient system MAY reject (with appropriate NDN) the entire message if it cannot store or is not capable of rendering a message with fax attachments. VPIM conforming systems MAY support fax outside of (or without) the Multipart/Voice-Message.

Some deployed implementations based on a common interpretation of the original VPIM V2 specification reject messages with fax content within the Multipart/Voice-Message rather than discard the unsupported contents. These systems will return the message to the sender with an NDN indicating lack of support for fax.

4.5. Other MIME Contents

The following MIME contents (with the exception of multipart/mixed in section 4.5.1) MAY be included within a multipart/voice message. Other contents MUST NOT be included. Their handling is a local implementation issue. Multipart/mixed is included to promote interoperability with a wider range of systems and also to allow the creation of more complex multimedia messages (with a VPIM message as one part).

4.5.1. Multipart/Mixed

This common MIME content-type allows the enclosing of several body parts in a single message.

SEND RULES

A VPIM voice message (i.e., multipart/voice-message) MAY be included within a message with a Multipart/Mixed top-level content type. Typically, this would only be used when mixing non-voice and non-fax contents with a voice message.

RECEIVE RULES

Such a message is not itself a VPIM message and the handling of such a construct is outside the scope of the VPIM profile. However, an the spirit of liberal acceptance, a conforming implementation MUST accept and render a VPIM voice message contained in a Multipart/Mixed.

4.5.2. Text/Directory

SEND RULES

This content was profiled in the original specification of VPIM v2 as a means of transporting contact information from the sender to the recipient. This usage did not find widespread adoption and is no longer a feature of VPIM V2. Conforming implementations SHOULD NOT send the Text/Directory content type.

RECEIVE RULES

For compatibility with an earlier specification of VPIM v2, the Text/Directory content type MUST be accepted by a conforming implementation, but need not be stored, processed, or rendered to the recipient.

4.5.3. Proprietary Voice or Fax Formats

Use of any other encoding except the required codecs reduces interoperability in the absence of explicit knowledge about the capabilities of the recipient. A conforming implementation SHOULD NOT use any other encoding unless a unique identifier is registered with the IANA prior to use (see [MIME4]). The voice encodings SHOULD be registered as subtypes of Audio. The fax encodings SHOULD be registered as subtypes of Image.

SEND RULES

Proprietary voice encoding formats or other standard formats SHOULD NOT be sent under this profile unless the sender has a reasonable expectation that the recipient will accept the encoding. In practice, this requires explicit per-destination configuration information maintained either in a directory, personal address book, or gateway configuration tables.

RECEIVE RULES

Systems MAY accept other Audio/* or Image/* content types if they can decode them. Systems which receive Audio/* or Image/* content types which they are unable to deposit or unable to render MUST return the message (and SHOULD include the original content) to the originator with an NDN indicating media not supported.

4.5.4. Text/Plain

MIME requires support of the basic Text/Plain content type (with the US-ASCII character set). This content type has limited applicability within the voice-messaging environment. However, because VPIM is a MIME profile, MIME requirements SHOULD be met.

SEND RULES

Conforming VPIM implementations SHOULD NOT send the Text/Plain content-type. Implementations MAY send the Text/Plain content-type outside the Multipart/Voice-Message.

RECEIVE RULES

Within a Multipart/Voice-Message, the Text/Plain content-type MAY be dropped from the message, if necessary, to deliver the audio/fax components. The recipient SHOULD NOT reject the entire message if the text component cannot be accepted or rendered.

Outside a Multipart/Voice-Message, conforming implementations MUST accept Text/Plain; however, specific handling is left as an implementation decision. From: [MIME2]

Some deployed implementations based on a common interpretation of the original VPIM V2 specification reject messages with any text content rather than discard the unsupported contents. These systems will return the message to the sender with an NDN indicating lack of support for text.

4.6. Delivery Status Notification (DSN)

A DSN is a notification of delivery (positive DSN), non-delivery (negative DSN), or temporary delivery delay (delayed DSN). The top-level content-type of a DSN is Multipart/Report, which is defined in [REPORT]. The content-type which distinguishes DSN's from other types of notifications is Message/Delivery-Status, which is defined in [DSN].

SEND RULES

A VPIM-compliant implementation MUST be able to send DSN's that conform to [REPORT] and [DSN]. Unless requested otherwise, a non-delivery DSN MUST be sent when any form of non-delivery of a message occurs.

A VPIM-compliant implementation SHOULD provide a spoken delivery status in the "human-readable" body part of the DSN, but MAY provide a textual status.

RECEIVE RULES

A VPIM-compliant implementation MUST be able to receive DSN's that conform to [REPORT] and [DSN].

A VPIM-compliant implementation MUST be able to receive a DSN whose "human-readable" body part contains a spoken delivery status phrase or a textual description. Though subsequent use of the phrase or text is a local implementation issue, the intent of the DSN MUST be presented to the end user.

4.7. Message Disposition Notification (MDN)

An MDN is a notification indicating what happens to a message after it is deposited in the recipient's mailbox. An MDN can be positive (message was read/played/rendered/etc.) or negative (message was deleted before recipient could see it, etc.). The top-level content-type of a MDN is Multipart/Report, which is defined in [REPORT]. The content-type which distinguishes MDN's from other types of notifications is Message/Disposition-Notification, which is defined in [MDN].

SEND RULES

A VPIM-compliant implementation SHOULD support the ability to request MDNs. This is done via the use of the "Disposition-Notification-To:" header field as defined in [MDN].

A VPIM-compliant implementation SHOULD support the ability to send MDNs, but these MDNs MUST conform to [REPORT] and [MDN].

When sending an MDN, a VPIM-compliant implementation SHOULD provide a spoken message disposition in the "human-readable" body part of the MDN, but MAY provide a textual status.

RECEIVE RULES

A VPIM-compliant implementation SHOULD respond to an MDN request with an MDN response.

A VPIM-compliant implementation MUST be able to receive MDNs that conform to [REPORT] and [MDN], if it is capable of requesting MDNs. If a VPIM-compliant implementation is capable of receiving MDNs, it MUST be able to receive a MDN whose "human-readable" body part contains a spoken message disposition phrase or a textual disposition description. Though subsequent use of the phrase or text is a local implementation issue, the intent of the MDN MUST be presented to the end user.

4.8. Forwarded Messages

VPIM v2 explicitly supports the forwarding of voice and fax content with voice or fax annotation. However, only the two constructs described below are acceptable in a VPIM message. Since only the first (i.e., Message/RFC822) can be recognized as a forwarded message (or even multiple forwarded messages), it is RECOMMENDED that this construct be used whenever possible.

Forwarded VPIM messages SHOULD be sent as a Multipart/Voice-Message with the entire original message enclosed in a Message/RFC822 content-type and the annotation as a separate Audio/* or Image/* body part. If the RFC822 header fields are not available for the forwarded content, simulated header fields with available information SHOULD be constructed to indicate the original sending timestamp, and the original sender as indicated in the "From:" field. Note that at least one of "From:", "Subject:", or "Date:" MUST be present. As well, the Message/RFC822 content MUST include at least the "MIME-Version:", and "Content-Type:" header fields. From: [MIME2]

In the event that forwarding information is lost, the entire audio content MAY be sent as a single Audio/* segment without including any forwarding semantics. An example of this loss is an AMIS message being forwarded through an AMIS-to-VPIM gateway.

4.9. Reply Messages

VPIM v2 explicitly supports replying to received messages.

Support of multiple originator header fields in a reply message is often not possible on voice messaging systems, so it may be necessary to choose only one when gatewaying a VPIM message to another voice message system. However, implementers should note that this may make it impossible to send DSN’s, MDN’s, and replies to their proper destinations.

In some cases, replying to a message is not possible, such as with a message created by telephone answering (i.e., classic voice mail). In this case, the From field SHOULD contain the special address non-mail-user@domain (see 4.1.2). The recipient’s VPIM system SHOULD NOT offer the option to reply to this kind of message (unless an outcalling feature is offered - which is out of scope for VPIM).

5. Message Transport Protocol

Messages are transported between voice mail machines using the Internet Extended Simple Mail Transfer Protocol (ESMTP). All information required for proper delivery of the message is included in the ESMTP dialog. This information, including the sender and recipient addresses, is commonly referred to as the message "envelope". This information is equivalent to the message control block in many analog voice messaging protocols.

ESMTP is a general-purpose messaging protocol, designed both to send mail and to allow terminal console messaging. Simple Mail Transport Protocol (SMTP) was originally created for the exchange of US-ASCII 7-bit text messages. Binary and 8-bit text messages have

traditionally been transported by encoding the messages into a 7-bit text-like form. [ESMTP] formalized an extension mechanism for SMTP, and subsequent RFCs have defined 8-bit text networking, command streaming, binary networking, and extensions to permit the declaration of message size for the efficient transmission of large messages such as multi-minute voice mail.

The following sections list ESMTP commands, keywords, and parameters that are required and those that are optional for conformance to this profile.

5.1. Base SMTP Protocol

A conforming system MUST implement all mandatory SMTP and ESMTP commands. Any defined optional command or parameter MAY be supported.

5.2. SMTP Service Extensions

VPIM utilizes a number of SMTP Service Extensions to provide full-featured voice messaging service. The following extensions are profiled for use with VPIM:

5.2.1. DSN Extension

The DSN extension defines a mechanism which allows an SMTP client to specify (a) DSN's should be generated under certain conditions, (b) whether such DSN's should return the contents of the message, and (c) additional information, to be returned with a DSN, that allows the sender to identify both the recipient(s) for which the DSN was issued, and the transaction in which the original message was sent.

The DSN extension MUST be supported by VPIM conforming implementations.

In addition, beyond the requirements of [DRPT], conforming implementations MUST support NOTIFY parameter on the RCPT command to allow indication of when the originator requests a notification. The RET parameter SHOULD be supported to return the original message with the notification. Parameters ORCPT and ENVID MAY also be supported. From: [DRPT]

5.2.2. SIZE Extension

The SIZE extension defines a mechanism whereby an SMTP client and server may interact to give the server an opportunity to decline to accept a message (perhaps temporarily) based on the client's estimate of the message size. From: [SIZE]

The SIZE extension MUST be supported by VPIM-compliant implementations.

5.2.3. ENHANCEDSTATUSCODES Extension

The ENHANCEDSTATUSCODES extension defines a mechanism whereby an SMTP server augments its responses with the enhanced mail system status codes defined in [CODES]. These codes can then be used to provide more informative explanations of error conditions. From: [STATUS]

The ENHANCEDSTATUSCODES extension SHOULD be supported by VPIM-compliant implementations.

5.2.4. PIPELINING Extension

The PIPELINING extension defines a mechanism whereby an SMTP server can indicate the extent of its ability to accept multiple commands in a single TCP send operation. Using a single TCP send operation for multiple commands can improve SMTP performance significantly. From [PIPE]

The PIPELINING extension SHOULD be supported by VPIM-compliant implementations.

5.2.5. CHUNKING Extension

The CHUNKING extension defines a mechanism that enables an SMTP client and server to negotiate the use of the message data transfer command "BDAT" (in alternative to the DATA command) for efficiently sending large MIME messages. From: [BINARY]

The CHUNKING extension MAY be supported by VPIM-compliant implementations.

5.2.6. BINARYMIME Extension

The BINARYMIME extension defines a mechanism that enables an SMTP client and server to negotiate the transfer of unencoded binary message data utilizing the BDAT command. From: [BINARY]

The BINARYMIME extension MAY be supported by VPIM-compliant implementations. Note that [BINARY] specifies that if BINARYMIME is to be supported, then CHUNKING has to be supported by definition.

5.3. ESMTP - SMTP Downgrading

The SMTP extensions suggested or required for conformance to VPIM fall into two categories. The first category includes features that increase the efficiency of the transport system such as SIZE, BINARYMIME, and PIPELINING. In the event of a downgrade to a less-functional transport system, these features can be dropped with no functional change to the sender or recipient.

The second category of features is transport extensions in support of new functions. DSN and ENHANCEDSTATUSCODES provide essential improvements in the handling of delivery status notifications to bring email to the level of reliability expected of Voice Mail. To ensure a consistent level of service across an intranet or the global Internet, it is essential that VPIM-conforming ESMTP support the DSN extension at all hops between a VPIM originating system and the recipient system. In the situation where a "downgrade" is unavoidable a relay hop may be forced (by the next hop) to forward a VPIM message without the ESMTP request for delivery status notification. It is RECOMMENDED that the downgrading system should continue to attempt to deliver the message, but MUST send an appropriate delivery status notification to the originator, e.g., the message left an ESMTP host and was sent relayed to a non-DSN-aware destination, and this may be the last DSN received.

6. Directory Address Resolution

It is the responsibility of a VPIM system to provide the fully-qualified domain name (FQDN) of the recipient based on the address entered by the user (if the entered address is not already a FQDN). This would typically be an issue on systems that offer only a telephone user interface. The mapping of the dialed target number to a routable FQDN address, allowing delivery to the destination system, can be accomplished through implementation-specific means.

To facilitate a local cache, an implementation may wish to populate local directories with the first and last names, as well as the senders' spoken name information extracted from received messages. Addresses or names parsed from the header fields of VPIM messages MAY be used to populate directories.

7. Management Protocols

The Internet protocols provide a mechanism for the management of messaging systems, from the management of the physical network through the management of the message queues. SNMP SHOULD be supported on a VPIM-conforming machine.

7.1. Network Management

The digital interface to the VM and the TCP/IP protocols MAY be managed. MIB II MAY be implemented to provide basic statistics and reporting of TCP and IP protocol performance [MIB II].

8. Conformance Requirements

VPIM is a messaging application that will be supported in several environments and be supported on differing devices. These environments include traditional voice processing systems, desktop voice messaging systems, store-and-forward relays, and protocol translation gateways.

In order to accommodate all environments, this document defines two areas of conformance: transport and content.

Transport-conformant systems will pass VPIM messages in a store-and-forward manner with assured delivery notifications and without the loss of information. It is expected that most store-and-forward Internet mail-based messaging systems will be VPIM transport-conformant.

Content-conformant systems will generate and interpret VPIM messages. Conformance in the generation of VPIM messages indicates that the restrictions of this profile are honored. Only contents specified in this profile or extensions agreed to by bilateral agreement may be sent. Conformance in the interpretation of VPIM messages indicates that all VPIM content types and constructs can be received; that all mandatory VPIM content types can be decoded and presented to the recipient in an appropriate manner; and that any unrenderable contents result in the appropriate notification.

A summary of the conformance requirements is contained in Appendix A.

VPIM end systems are expected to be both transport- and content-conformant. Voice messaging systems and protocol conversion gateways are considered end systems.

Relay systems are expected to be transport-conformant in order to receive and send conforming messages. However, they must also create VPIM-conforming delivery status notifications in the event of delivery problems.

Desktop Email clients that support VPIM are expected to be content-conformant. Desktop email clients use various protocols and API’s for exchanging messages with the local message store and message transport system. While these clients may benefit from VPIM

transport capabilities, specific client-server requirements are out-of-scope for this document.

9. Security Considerations

9.1. General Directive

This document is a profile of existing Internet mail protocols. To maintain interoperability with Internet mail, any security to be provided should be part of the Internet security infrastructure, rather than a new mechanism or some other mechanism outside of the Internet infrastructure.

9.2. Threats and Problems

Both Internet mail and voice messaging have their own set of threats and countermeasures. As such, this specification does not create any security issues not already existing in the profiled Internet mail and voice mail protocols themselves. This section attends only to the set of additional threats that ensue from integrating the two services.

9.2.1. Spoofed sender

The actual sender of the voice message might not be the same as that specified in the "Sender:" or "From:" message header fields or the MAIL FROM address from the SMTP envelope. In a tightly constrained environment, sufficient physical and software controls may be able to ensure prevention of this problem. In addition, the recognition of the sender's voice may provide confidence of the sender's identity irrespective of that specified in "Sender:" or "From:". It should be recognized that SMTP implementations do not provide inherent authentication of the senders of messages, nor are sites under obligation to provide such authentication.

9.2.2. Unsolicited voice mail

Assigning an Internet mail address to a voice mailbox opens the possibility of receiving unsolicited messages (either text or voice mail). Traditionally, voice mail systems operated in closed environments and were not susceptible to unknown senders. Voice mail users have a higher expectation of mailbox privacy and may consider such messages as a security breach. Many Internet mail systems are choosing to block all messages from unknown sources in an attempt to curb this problem.

9.2.3. Message disclosure

Users of voice messaging systems have an expectation of a level of message privacy that is higher than the level provided by Internet mail without security enhancements. This expectation of privacy by users SHOULD be preserved as much as possible.

9.3. Security Techniques

Sufficient physical and software control may be acceptable in constrained environments. Further, the profile specified in this document does not in any way preclude the use of any Internet object or channel security protocol to encrypt, authenticate, or non-repudiate the messages.

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12. Appendix A - VPIM Requirements Summary

The following table summarizes the profile of VPIM version 2 detailed in this document. Since in many cases it is not possible to simplify the qualifications for supporting each feature this appendix is informative. The reader is recommended to read the complete explanation of each feature in the referenced section. The text in the previous sections shall be deemed authoritative if any item in this table is ambiguous.

The conformance table is separated into various columns:

Feature - name of protocol feature (note that the indenting indicates a hierarchy of conformance, i.e., the conformance of a lower feature is only relevant if there is conformance to the higher feature)

Section - reference section in main text of this document

Area - conformance area to which each feature applies:
C - content
T - transport

Status - whether the feature is mandatory, optional, or prohibited. The key words used in this table are to be interpreted as described in [REQ], though the following list gives a quick overview of the different degrees of feature conformance:

Must	- mandatory
Should	- required in the absence of a compelling need to omit.
May	- optional
Should not	- prohibited in the absence of a compelling need.
Must not	- prohibited

Footnote - special comment about conformance for a particular feature

VPIM version 2 Conformance

FEATURE	SECTION	ARE A	MUST	SHOU LD	MAY	SHOU LD NOT	MUST NOT	Foot note
Message Addressing Formats:								
Use DNS host names	4.1	C	x					
Use only numbers in mailbox IDs	4.1.1	C		x				
Numbers in mailbox IDs follow E.164	4.1.1	C		x				
Use alpha-numeric mailbox IDs	4.1.1	C			x			
Support of postmaster@domain	4.1.2	C	x					
Support of non-mail-user@domain	4.1.2	C		x				
Support of distribution lists	4.1.3	C			x			
Message Header Fields:								
Sending outbound messages								
From	4.2.1	C	x					
Addition of text name	4.2.1	C		x				
Same value as MAIL FROM	4.2.1	C		x				
To	4.2.2	C		x				1
cc	4.2.3	C			x			1
Date	4.2.4	C	x					
Sender	4.2.5	C			x			
Return-Path	4.2.6	C					x	
Message-ID	4.2.7	C	x					
Reply-To	4.2.8	C				x		
Received	4.2.9	C	x					
MIME Version: 1.0 (Voice 2.0)	4.2.10	C		x				
Content-Type	4.2.11	C	x					
Content-Transfer-Encoding	4.2.12	C	x					
Sensitivity	4.2.13	C			x			
Importance	4.2.14	C			x			
Subject	4.2.15	C		x				
Disposition-notification-to	4.7	C		x				
Other Headers	4.2	C			x			

FEATURE	SECTION	AREA	MUST	SHOULD	MAY	SHOULD NOT	MUST NOT	Footnote
Receiving inbound messages								
From	4.2.1	C	x					
Present text personal name	4.2.1	C			x			
To	4.2.2	C	x					
cc	4.2.3	C			x			
Date	4.2.4	C	x					
Conversion of Date to local time	4.2.4	C		x				
Sender	4.2.5	C			x			
Return-Path	4.2.6	C		x				
Message-ID	4.2.7	C			x			
MDN requested	4.2.7	C	x					
Reply-To	4.2.8	C			x			
Received	4.2.9	C			x			
MIME Version: 1.0 (Voice 2.0)	4.2.10	C		x				
Content Type	4.2.11	C	x					
Content-Transfer-Encoding	4.2.12	C	x					
Sensitivity	4.2.13	C	x					2
Importance	4.2.14	C			x			
Subject	4.2.15	C			x			
Disposition-notification-to	4.7	C		x				
Other Headers	4.2	C	x					3
Message Content Encoding:								
Sending outbound audio/fax contents								
7BIT	4.2.12	C					x	
8BIT	4.2.12	C					x	
Quoted Printable	4.2.12	C					x	
Base64	4.2.12	C	x					4
Binary	4.2.12	C		x				5
Receiving inbound message contents								
7BIT	4.2.12	C	x					
8BIT	4.2.12	C	x					
Quoted Printable	4.2.12	C	x					
Base64	4.2.12	C	x					
Binary	4.2.12	C	x					5

FEATURE	SECTION	AREA	MUST	SHOULD	MAY	SHOULD NOT	MUST NOT	Footnote
Message Content Types:								
Sending outbound messages								
Multipart/Voice-Message	4.4.1	C	x					
Message/RFC822	4.4.2	C		x				
Audio/32KADPCM	4.4.3	C	x					
Content-Description	4.3.1	C			x			
Content-Disposition	4.3.2	C	x					
Content-Duration	4.3.3	C			x			
Content-Language	4.3.4	C			x			
Image/TIFF; application=faxbw	4.4.4	C	x					7
Text/Directory	4.5.2	C				x		9
Text/plain	4.5.4	C				x		
Audio/* or Image/* (other encodings)	4.5.3	C				x		
Other contents	4.5	C					x	
Multipart/Mixed	4.5.1	C			x			
Text/plain	4.5.4	C			x			
Multipart/Report	4.6, 4.7	C	x					
human-readable part is voice	4.6, 4.7	C		x				
human-readable part is text	4.6, 4.7	C			x			
Message/Delivery-Status	4.6	C	x					
Message/Disposition-Notification	4.7	C		x				
Other contents	4.5	C				x		6
Receiving in inbound messages								
Multipart/Voice-Message	4.4.1	C	x					
Message/RFC822	4.4.2	C	x					
Audio/32KADPCM	4.4.3	C	x					
Content-Description	4.3.1	C			x			
Content-Disposition	4.3.2	C		x				
Content-Duration	4.3.3	C			x			
Content-Language	4.3.4	C			x			
Image/TIFF; application=faxbw	4.4.4	C		x				8
Text/Directory	4.5.2	C	x					9
Text/plain	4.5.4	C			x			
Audio/* or Image/* (other encodings)	4.5.3	C			x			
Other contents	4.5	C			x			
Multipart/Mixed	4.5.1	C			x			

FEATURE	SECTION	AREA	MUST	SHOULD	MAY	SHOULD NOT	MUST NOT	Footnote
Text/plain	4.5.4	C	x					
Multipart/Report	4.6, 4.7	C	x					
human-readable part is voice	4.6, 4.7	C	x					
human-readable part is text	4.6, 4.7	C	x					
Message/Delivery-Status	4.6	C	x					
Message/Disposition-Notification	4.7	C		x				
Other contents	4.5	C			x			6
Forwarded Messages								
use Message/RFC822 construct	4.8	C		x				
simulate headers if none available	4.8	C		x				
Reply Messages	4.9	C	x					
send to Reply-To, else From address	4.2.8	C			x			
send to non-mail-user	4.9	C				x		
Notifications								
use Multipart/Report format	4.6, 4.7	C	x					
always send error on non-delivery	4.6	C	x					
send error messages to return-path	4.2.6	C	x					
Message Transport Protocol:								
Base ESMTP Commands								
HELO	5.1	T	x					
MAIL FROM	5.1	T	x					
RCPT TO	5.1	T	x					
DATA	5.1	T	x					
TURN	5.1	T					x	
QUIT	5.1	T	x					
RSET	5.1	T	x					
VRFY	5.1	T			x			
EHLO	5.1	T	x					
BDAT	5.1	T			x			5

FEATURE	SECTION	AREA	MUST	SHOULD	MAY	SHOULD NOT	MUST NOT	Footnote
ESMTP Keywords & Parameters								
DSN	5.2.1	T	x					
NOTIFY	5.2.1	T	x					
RET	5.2.1	T		x				
ENVID	5.2.1	T			x			
ORCPT	5.2.1	T			x			
SIZE	5.2.2	T	x					
ENHANCEDSTATUSCODES	5.2.3	T		x				
PIPELINING	5.2.4	T		x				
CHUNKING	5.2.5	T			x			
BINARYMIME	5.2.6	T			x			
ESMTP-SMTP Downgrading								
send delivery report upon downgrade	5.3	T	x					
Directory Address Resolution								
provide facility to resolve addresses	6	C		x				
use headers to populate local directory	6	C			x			
Management Protocols:								
Network management	7.1	T			x			

Footnotes:

1. SHOULD leave blank if all recipients are not known or resolvable.
2. If a sensitive message is received by a system that does not support sensitivity, then it MUST be returned to the originator with an appropriate error notification. Also, a received sensitive message MUST NOT be forwarded to anyone.
3. If the additional header fields are not understood they MAY be ignored.
4. When binary transport is not available.
5. When binary transport is available.

6. Other un-profiled contents MUST only be sent by bilateral agreement.
7. If fax is supported.
8. If the fax content cannot be presented it MAY be dropped.
9. Handling of a vCard in text/directory is no longer defined.

13. Appendix B - Example Voice Messages

The following message is a full-featured message addressed to two recipients. The message includes the sender's spoken name, spoken subject and a short speech segment. The message is marked as important and private.

```
To: +19725551212@vm1.mycompany.com
To: +16135551234@VM1.mycompany.com
From: "Parsons, Glenn" <12145551234@VM2.mycompany.com>
Date: Mon, 26 Aug 93 10:20:20 -0700 (CDT)
MIME-Version: 1.0  (Voice 2.0)
Content-type: Multipart/Voice-Message; Version=2.0;
     Boundary="MessageBoundary"
Content-Transfer-Encoding: 7bit
Message-ID: 123456789@VM2.mycompany.com
Sensitivity: Private
Importance: High
```

```
--MessageBoundary
Content-type: Audio/32KADPCM
Content-Transfer-Encoding: Base64
Content-Disposition: inline; voice=Originator-Spoken-Name
Content-Language: en-US
Content-ID: part1@VM2-4321

glslfdslsertiflkTfpgkTportrpkTpfgTpoiTpdadasssdasddasdasd
(This is a sample of the base-64 Spoken Name data)
fgdhgddlkgpokpeowrit09==

--MessageBoundary
Content-type: Audio/32KADPCM
Content-Transfer-Encoding: Base64
Content-Disposition: inline; voice=Spoken-Subject
Content-Language: en-US
Content-ID: part2@VM2-4321

glslfdslsertiflkTfpgkTportrpkTpfgTpoiTpdadasssdasddasdasd
(This is a sample of the base-64 Spoken Subject data)
fgdhgddlkgpokpeowrit09==

--MessageBoundary
Content-type: Audio/32KADPCM
Content-Transfer-Encoding: Base64
Content-Description: Brand X Voice Message
Content-Disposition: inline; voice=Voice-Message; filename=msg1.726
Content-Duration: 25

iIiIiIjMzN3czdze3s7d7fwfHhcvESJVe/4yEhLz8/FOQjVFRERCESL/zqrq
(This is a sample of the base64 message data) zb8tFdLTQt1PXj
u7wjOyRhws+krdns7Rju0t4tLF7cE0K0MxOTOnRW/Pn30c8uHi9==

--MessageBoundary- -                          -                          -
```

The following message is a forwarded single segment voice. Both the forwarded message and the forwarding message contain the senders spoken names.

```
To: +12145551212@vm1.mycompany.com
From: "Vaudreuil, Greg" <+19725552345@VM2.mycompany.com>
Date: Mon, 26 Aug 93 10:20:20 -0700 (CDT)
MIME-Version: 1.0  (Voice 2.0)
Content-type: Multipart/Voice-Message; Version=2.0;
  Boundary="MessageBoundary"
Content-Transfer-Encoding: 7bit
Message-ID: ABCD-123456789@VM2.mycompany.com
```

```
--MessageBoundary
Content-type: Audio/32KADPCM
Content-Transfer-Encoding: Base64
Content-Disposition: inline; voice=Originator-Spoken-Name
Content-Language: en-US
Content-ID: part3@VM2-4321

glslfdslsertiflkTfpgkTportrpkTpfgTpoiTpdadasssdasddasdasd
(This is a sample of the base-64 Spoken Name data)
fgdhgd dlkgpokpeowrit09==

--MessageBoundary
Content-type: Audio/32KADPCM
Content-Description: Forwarded Message Annotation
Content-Disposition: inline; voice=Voice-Message
Content-Transfer-Encoding: Base64

glslfdslsertiflkTfpgkTportrpkTpfgTpoiTpdadasssdasddasdasd
(This is the voiced introductory remarks encoded in base64)
jrgoij3o45itj09fiuvdkjgWlakgQ93ijkpokfpgokQ90gQ5tkjpokfgW
dlkgpokpeowrit09==
```

```
--MessageBoundary
Content-type: Message/RFC822
Content-Transfer-Encoding: 7bit

To: +19725552345@VM2.mycompany.com
From: "Parsons, Glenn, W." <+16135551234@VM1.mycompany.com>
Date: Mon, 26 Aug 93 8:23:10 -0500 (EST)
Content-type: Multipart/Voice-Message; Version=2.0;
  Boundary="MessageBoundary2"
Content-Transfer-Encoding: 7bit
MIME-Version: 1.0  (Voice 2.0)

--MessageBoundary2
Content-type: Audio/32KADPCM
Content-Transfer-Encoding: Base64
Content-Disposition: inline; voice=Originator-Spoken-Name
Content-Language: en-US
Content-ID: part6@VM2-4321

glslfdslsertiflkTfpgkTportrpkTpfgTpoiTpdadasssdasddasdasd
(This is a sample of the base-64 Spoken Name data) fgdhgd
 dlkgpokpeowrit09==

--MessageBoundary2
Content-type: Audio/32KADPCM
Content-Disposition: inline; voice=Voice-Message
Content-Transfer-Encoding: Base64

glslfdslsertiflkTfpgkTportrpkTpfgTpoiTpdadasssdasddasdasd
(This is the original message audio data) fgwersdfmniwrjj
jrgoij3o45itj09fiuvdkjgWlakgQ93ijkpokfpgokQ90gQ5tkjpokfgW
dlkgpokpeowrit09==

--MessageBoundary2--

--MessageBoundary--
```

The following example is for a DSN sent to the sender of a message by a VPIM gateway at VM1.company.com for a mailbox which does not exist.

```
Date: Thu, 7 Jul 1994 17:16:05 -0400
From: Mail Delivery Subsystem <MAILER-DAEMON@vm.company.com>
Message-ID: <199407072116.RAA14128@vm1.company.com>
Subject: Returned voice message
To: 2175552345@VM2.mycompany.com
MIME-Version: 1.0
Content-Type: multipart/report; report-type=delivery-status;
  boundary="RAA14128.773615765/VM1.COMPANY.COM"

--RAA14128.773615765/VM1.COMPANY.COM
Content-type: Audio/32KADPCM
Content-Description: Spoken Delivery Status Notification
Content-Disposition: inline; voice= Voice-Message-Notification
Content-Transfer-Encoding: Base64

glslfdslsertiflkTfpgkTportrpkTpfgTpoiTpdadadffsssddasdasd
(This is a voiced description of the error in base64)
jrgoij3o45itj09fiuvdkjgWlakgQ93ijkpokfpgokQ90gdffkjpokfgW
dlkgpokpeowrit09==

--RAA14128.773615765/VM1.COMPANY.COM
Content-type: Message/Delivery-Status

Reporting-MTA: dns; vm1.company.com

Original-Recipient: rfc822; 2145551234@VM1.mycompany.com
Final-Recipient: rfc822; 2145551234@VM1.mycompany.com
Action: failed
Status: 5.1.1 (User does not exist)
Diagnostic-Code: smtp; 550 Mailbox not found
Last-Attempt-Date: Thu, 7 Jul 1994 17:15:49 -0400
```

```
      --RAA14128.773615765/VM1.COMPANY.COM
      content-type: Message/RFC822

      [original VPIM message goes here]

      --RAA14128.773615765/VM1.COMPANY.COM--
```

The following example is for an MDN sent to the original sender for a message that has been played. This delivered VPIM message was received by a corporate gateway and relayed to a unified mailbox.

```
Date: Thu, 7 Jul 1994 17:16:05 -0400
From: "Greg Vaudreuil" <22722@vm.company.com>
Message-ID: <199407072116.RAA14128@exchange.company.com>
Subject: Voice message played
To: 2175552345@VM2.mycompany.com
MIME-Version: 1.0
Content-Type: multipart/report;
        Report-type=disposition-notification;
        Boundary="RAA14128.773615765/EXCHANGE.COMPANY.COM"

--RAA14128.773615765/EXCHANGE.COMPANY.COM
Content-type: Audio/32KADPCM
Content-Description: Spoken Disposition Notification
Content-Disposition: inline; voice= Voice-Message-Notification
Content-Transfer-Encoding: Base64

glslfdslsertiflkTfpgkTportrpkTpfgTpoiTpdadadffsssddasdasd
(Voiced description of the disposition action in base64)
jrgoij3o45itj09fiuvdkjgWlakgQ93ijkpokfpgokQ90gdffkjpokfgW
dlkgpokpeowrit09==

--RAA14128.773615765/EXCHANGE.COMPANY.COM
Content-type: Message/Disposition-Notification

Reporting-UA: gregs-laptop.dallas.company.com (Unified FooMail 3.0)

Original-Recipient: rfc822;22722@vm.company.com
Final-Recipient: rfc822;Greg.Vaudreuil@foomail.company.com
Original-Message-ID: <199509192301.12345@vm2.mycompany.com>
Disposition: manual-action/MDN-sent-automatically; displayed

--RAA14128.773615765/EXCHANGE.COMPANY.COM
Content-type: Message/RFC822

[original VPIM message goes here]

--RAA14128.773615765/EXCHANGE.COMPANY.COM--
```

14. Appendix C - Example Error Voice Processing Error Codes

The following common voice processing errors and their corresponding status codes are given as examples. The text after the error codes is intended only for reference to describe the error code. Implementations should provide implementation-specific informative comments after the error code rather than the text below.

Error condition	RFC 1893 Error codes
Analog delivery failed because remote system is busy	4.4.1 Persistent connection error - busy
Analog delivery failed because remote system is ring-no-answer	4.4.1 Persistent protocol error - no answer from host
Remote system did not answer AMIS-Analog handshake ("D" in response to "C" at connect time)	5.5.5 Permanent protocol error - wrong version
Mailbox does not exist	5.1.1 Permanent mailbox error - does not exist
Mailbox full or over quota	4.2.2 Persistent mailbox error - full
Disk full	4.3.1 Persistent system error - full
Command out of sequence	5.5.1 Permanent protocol error - invalid command
Frame Error	5.5.2 Permanent protocol error - syntax error
Mailbox does not support FAX	5.6.1 Permanent media error - not supported
Mailbox does not support TEXT	5.6.1 Permanent media error - not supported
Sender is not authorized	5.7.1 Permanent security error - sender not authorized

Message marked private, but system is not private capable	5.3.3 Permanent system error - not feature capable

15. Appendix D - Example Voice Processing Disposition Types

The following common voice processing disposition conditions and their corresponding MDN Disposition (which contains the disposition mode, type and modifier, if applicable) are given as examples. Implementers should refer to [MDN] for a full description of the format of message disposition notifications.

Notification event	MDN Disposition mode, type & modifier
Message played by recipient, receipt automatically returned	manual-action/MDN-sent-automatically; displayed
Message deleted from mailbox by user without listening	manual-action/MDN-sent-automatically; deleted
Message cleared when mailbox deleted by admin	manual-action/MDN-sent-automatically; deleted/mailbox-terminated
Message automatically deleted when older than administrator set threshold	automatic-action/ MDN-sent-automatically; deleted/ expired
Message processed, however audio encoding unknown - unable to play to user	manual-action/MDN-sent-automatically; processed/error Error: unknown audio encoding

16. Appendix E - IANA Registrations

There are no changes to the registration per [DISP] of the voice content disposition parameter defined in the earlier VPIM V2 document, RFC 2421. There are no changes to the registration per [MIME4] of the Multipart/voice-message content type defines in the earlier VPIM v2 document, RFC 2423.

Both are presented here for information.

16.1. Voice Content-Disposition Parameter Definition

To: IANA@IANA.ORG

Subject: Registration of new Content-Disposition parameter

Content-Disposition parameter name: voice

Allowable values for this parameter:

Voice-Message - the primary voice message,
Voice-Message-Notification - a spoken delivery notification or spoken disposition notification,
Originator-Spoken-Name - the spoken name of the originator,
Recipient-Spoken-Name - the spoken name of the recipient if available to the originator and present if there is ONLY one recipient,
Spoken-Subject- the spoken subject of the message, typically spoken by the originator

Description:

In order to distinguish between the various types of audio contents in a VPIM voice message a new disposition parameter "voice" is defined with the preceding values to be used as appropriate. Note that there SHOULD only be one instance of each of these types of audio contents per message level. Additional instances of a given type (i.e., parameter value) may occur within an attached forwarded voice message.

16.2. Multipart/Voice-Message MIME Media Type Definition

To: ietf-types@iana.org
Subject: Registration of MIME media type
Multipart/voice-message

MIME media type name: multipart

MIME subtype name: voice-message

Required parameters: boundary, version

The use of boundary is defined in [MIME2]

The version parameter that contains the value "2.0" if enclosed content conforms to [VPIM2R2]. The absence of this parameter indicates conformance to the previous version defined in RFC 1911 [VPIM1].

Optional parameters: none

Encoding considerations: 7bit, 8bit or Binary

Security considerations:

This definition identifies the content as being a voice message. In some environments (though likely not the majority), the loss of the anonymity of the content may be a security issue.

Interoperability considerations:

Systems developed to conform with [VPIM1] may not conform to this registration. Specifically, the required version will likely be absent, in this case the recipient system should still be able to accept the message and will be able to handle the content. The VPIM v1 positional identification, however, would likely be lost.

Published specification:
This document

Applications that use this media type:

Primarily voice messaging

Additional information:

Magic number(s): none
File extension(s): .VPM
Macintosh File Type Code(s): VPIM

Person & email address to contact for further information:

Glenn W. Parsons
gparsons@nortelnetworks.com

Gregory M. Vaudreuil
gregv@ieee.org

Intended usage: COMMON

Author/Change controller:

Glenn W. Parsons & Gregory M. Vaudreuil

17. Appendix F - Change History: RFC 2421 (VPIM V2) to this Document

The updated profile in this document is based on the implementation and operational deployment experience of several vendors. The changes are categorized as general, content, transport and conformance. They are summarized below:

1. General

   - Various and substantial editorial updates to improve readability.

   - Separated send rules from receive rules to aid clarity.

   - Clarified the behavior upon reception of unrecognized content types expected with the interworking between voice and unified messaging systems. (E.g., Unsupported non-audio contents should be discarded to deliver the audio message.)

   - Reworked the sensitivity requirements to align them with X.400. Eliminated dependencies upon the MIXER documents.

   - Reorganized the content-type descriptions for clarity

2. Content

   - Changed handling of received lines by a gateway to SHOULD NOT delete in a gateway. In gateways to systems such as AMIS, it is not possible to preserve this information. It is intended that such systems be able to claim conformance.

   - Eliminated the vCard as a supported VPIM V2 content type.

   - Merged in text from RFC 2423 (Multipart/voice-message)

3. Transport

   - None

4. Conformance

   - Aligned the table of Appendix A to the requirements in the text.

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