

## Voice Messaging Directory Service

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### Abstract

This document provides details of the Voice Profile for Internet Mail (VPIM) directory service. The service provides the email address of the recipient that is given a telephone number. It optionally provides the spoken name of the recipient and the media capabilities of the recipient.

The VPIM directory Schema provides essential additional attributes to recreate the voice mail user experience using standardized directories. This user experience provides, at the time of addressing, basic assurances that the message will be delivered as intended. This document combines two earlier documents, one from Anne Brown and one from Greg Vaudreuil, that define a voice messaging schema into a single working group submission.

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## 1. Scope

## 1.1. Design Goals

The VPIM directory Schema (VPIMDIR) is accessed from outside the enterprise or service provider domain using the recipient's telephone number.

## 1.2. Performance Constraints

Once the identity of the VPIM directory server is known, the email address, capabilities, and spoken name confirmation information can be retrieved. This query is expected to use LDAP [LDAP], a connection-oriented protocol. The protocol transaction includes multiple packet round-trips to execute the query and retrieval and is considered to be the highest latency element of the messaging service. Further, retrieval of the confirmation information may require the return of a spoken name segment of up to 20kbytes (5 seconds at 4kbytes/second). Over a sufficiently engineered Internet connection, a 1250 ms response time is believed to be achievable over the Internet at large.

### 1.3. Scaling Constraints

A service provider's namespace is expected to include entries for tens of millions of subscribers in a flat namespace based on the VPIM inter-domain address form: `telephone_number@domain_name`. A large corporation may have a hundred-thousand entries, while a large service provider may have tens of millions of entries in a single domain. It is expected that there will be a single public address validation service for a given service provider's network. It is believed that existing directory technology, including horizontal scalability through replication, will provide sufficient transaction throughput within the required latency requirements to address this need. The only fundamental, new requirement this application imposes on directory servers, beyond similar existing services, is the ability to return the recipient's spoken name. Preliminary investigation suggests that storage and retrieval of a spoken name will not add appreciable latency; however, it will add to the need for storage capacity.

### 1.4. Reliability Constraints

DNS provides well-documented redundancy and load-balancing capabilities for the VPIMDIR. However, the latency requirements to the end-user may not permit client-side fail-over to a secondary server and may require the directory server to be implemented as a high-availability service.

## 2. The VPIMUser Directory Schema

```
(IANA-ASSIGNED-OID.1 NAME 'vPIMUser'
  SUP 'top'
  AUXILIARY
  MUST ( vPIMRfc822Mailbox $
         vPIMTelephoneNumber )
  MAY  ( vPIMSpokenName $
         vPIMSupportedUABehaviors $
         vPIMSupportedAudioMediaTypes $
         vPIMSupportedMessageContext $
         vPIMTextName $
         vPIMExtendedAbsenceStatus $
         vPIMMaxMessageSize $
         vPIMSubMailboxes ) )
```

When present, the vPIMUser object contains information useful for verifying that the dialed telephone number corresponds to the intended recipient. This object also provides capability information and mailbox status information useful for guiding composition by the sender and for setting delivery expectations at sending time.

## 2.1. vPIMTelephoneNumber

The attribute vPIMTelephoneNumber is the full E.164 form of the telephone number [E164], including any sub-addressing portion. The normal search will be for this attribute.

```
( IANA-ASSIGNED-OID.2.1 NAME 'vPIMTelephoneNumber'  
    EQUALITY caseIgnoreMatch  
    SYNTAX 1.3.6.1.4.1.1466.115.121.1.44{20} )
```

Example: A North American telephone number with the sub address of 12 would be represented as "+12145551212+12".

Note that vPIMTelephoneNumber is, by default, a multi-valued attribute. But if an entry has multiple values for this attribute, those values MUST be distinct from each other in the telephone number portion. It is expected that each submailbox of a single telephone number will have its own vPIMUser entry.

The vPIMTelephoneNumber differs from telephoneNumber in [LDAP] in its support for sub-addressing information and its use as a voice messaging address. In most cases, these values will be the same.

The telephone number is stored with no parenthesis, spaces, dots, or hyphens. The leading '+' and the '+' delineating the submailbox are required markup.

## 2.2. vPIMRfc822Mailbox

The attribute vPIMRfc822Mailbox stores the inter-domain SMTP address of the voice mailbox associated with a given telephone number. It is defined as a distinct attribute to distinguish it from the rfc822Mailbox attribute that may be used for other purposes. Although it would be preferable to define vPIMRfc822Mailbox as a subtype of rfc822Mailbox, it is defined here as an entirely new attribute because some directory implementations do not support sub-typing.

```
( IANA-ASSIGNED-OID.2.2 NAME 'vPIMRfc822Mailbox'  
    EQUALITY caseIgnoreIA5Match  
    SYNTAX 1.3.6.1.4.1.1466.115.121.1.26{256} )
```

## 2.3. vPIMSpokenName

The vPIMSpokenName attribute is an octet string and MUST be encoded in 32 kbit/s ADPCM exactly, as defined by [32KADPCM]. vPIMSpokenName shall contain the spoken name of the user in the voice of the user. The length of the spoken name segment MUST NOT exceed five seconds.

Private or additional encoding types are outside the scope of this version.

```
(IANA-ASSIGNED-OID.2.3 NAME 'vPIMSpokenName'  
    EQUALITY octetStringMatch  
    SYNTAX 1.3.6.1.4.1.1466.115.121.1.40{20000}  
    SINGLE-VALUE )
```

#### 2.4. vPIMTextName

The text name is designed to be consistent with the unstructured text name databases used for calling name delivery service of caller ID.

```
(IANA-ASSIGNED-OID.2.4 NAME 'vPIMTextName'  
    EQUALITY caseIgnoreMatch  
    SYNTAX 1.3.6.1.4.1.1466.115.121.1.15{20}  
    SINGLE-VALUE )
```

#### 2.5. vPIMSupportedAudioMediaTypes

The vPIMSupportedAudioMediaTypes attribute indicates the type(s) of audio encodings that can be received at the address specified in vPIMRfc822Mailbox.

```
(IANA-ASSIGNED-OID.2.5 NAME 'vPIMSupportedAudioMediaTypes'  
    EQUALITY caseIgnoreIA5Match  
    SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 )
```

This is a multi-value attribute. The allowable values for this attribute are the MIME audio subtypes registered with IANA. Non-standard and private encoding types must be indicated by prepending the new type name with either "X-" or "x-".

Because ADPCM is a required format, the audio32kadpcm value must be listed if this attribute is present.

#### 2.6. vPIMSupportedMessageContext

The message context provides guidance to the sender about the message contexts the recipient is likely to accept. Message context provides less precise information about a given recipient's capabilities than a list of media types. However, given the growing role of media-conversion gateways, the context indicator provides more useful guidance to a sender in a "unified messaging" environment.

```
(IANA-ASSIGNED-OID.2.6 NAME 'vPIMSupportedMessageContext'  
    EQUALITY caseIgnoreIA5Match  
    SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 )
```

This is a multi-value attribute. The set of valid message context values is defined in [CONTEXT].

## 2.7. vPIMExtendedAbsenceStatus

It is common to have an attribute that indicates to the subscriber whether the recipient is accepting messages during his absence. This feature -- called "extended absence" -- provides an advisory message at sending time. It is similar in concept to "vacation notices" common for textual email, but has its own cultural and operational nuances.

```
(IANA-ASSIGNED-OID.2.7 NAME 'vPIMExtendedAbsenceStatus'  
    EQUALITY caseIgnoreIA5Match  
    SYNTAX 1.3.6.1.4.1.1466.115.121.1.26  
    SINGLE-VALUE )
```

The three values defined are:

"Off", "On", "MsgBlocked"

"Off" indicates that the recipient either does not support extended absence or has not set such an indicator. "Off" is the default condition if this attribute is not returned.

"On" indicates that the recipient has set an extended absence indicator, but the mailbox is still accepting messages for review at an unspecified future time.

"MsgBlocked" indicates that the recipient has set an extended absence indicator and the mailbox is currently configured to reject incoming messages. Messages SHOULD NOT be sent to the recipient if this value is returned in the vPIMExtendedAbsenceStatus attribute.

## 2.8. vPIMSupportedUABehaviors

Internet mail does not provide facilities for the sender to know whether the recipient supports a number of optional features that can be requested or indicated in the RFC822 headers. This attribute provides a list of the attributes, considered optional by VPIM and other vendor-specific attributes, that may be supported by the recipient. If this attribute is not supported, only those attributes

listed as mandatory in VPIM are assumed to be supported. Undisclosed behaviors may be indicated in the RFC822 message; however, there is no assurance by the receiving system of their support.

```
(IANA-ASSIGNED-OID.2.8 NAME 'vPIMSupportedUABehaviors'  
    EQUALITY caseIgnoreIA5Match  
    SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 )
```

The following behaviors are defined:

```
MessageDispositionNotification  
MessageSensitivity  
MessageImportance
```

The presence of the MessageDispositionNotification value indicates that the recipient will send an MDN in response to an MDN request.

MessageSensitivity indicates that the recipient fully supports the sensitivity indication as defined in VPIM [VPIMV2].

MessageImportance indicates that the recipient fully supports the importance indication as defined in VPIM [VPIMV2].

These may be further extended without standardization to include proprietary user interface functional extensions. These proprietary extension values must be prefixed with an "X-" or "x-".

## 2.9. vPIMMaxMessageSize

At the time of composition, the message can be checked for acceptable length using the maximum message size attribute. Maximum message size is an attribute usually configured by policy of the receiving system, typically in units of minutes. While ESMTP provides a mechanism to determine if a message is too long in bytes, it is an unreliable guide for the composer when multiple encodings, multiple media, or variable bit-rate encodings are supported.

```
(IANA-ASSIGNED-OID.2.9 NAME 'vPIMMaxMessageSize'  
    EQUALITY integerMatch  
    SYNTAX 1.3.6.1.4.1.1466.115.121.1.27  
    SINGLE-VALUE )
```

The attribute indicates the maximum message length in seconds that the receiving mailbox may receive.

## 2.10. vPIMSubMailboxes

This attribute indicates the presence of sub-mailboxes for the queried telephone number. This information may be used to provide a post-dial sub-addressing menu to the sender.

```
(IANA-ASSIGNED-OID.2.10 NAME 'vPIMSubMailboxes'  
    EQUALITY numericStringMatch  
    SYNTAX 1.3.6.1.4.1.1466.115.121.1.36{4} )
```

The allowable values include a list of sub-mailbox numbers with a numeric range of 1-9999. The user interface may use this information to prompt the sender to select a sub-mailbox. Spoken names associated with each sub-mailbox may be individually retrieved by subsequent queries to the recipient's VPIMDIR service.

## 3. Security Considerations

The following are known security issues.

- 1) Service provider customer information is very sensitive, especially in this time of local phone competition. Service providers require maximum flexibility to protect this data. Because of the dense nature of telephone number assignments, this data is subject to "go fish" queries via repeated LDAP queries to determine a complete list of current or active messaging subscribers. To reduce the value of this retrieved data, service providers may limit disclosure of data that is useful for telemarketing, such as the textual name, and may disclose only information useful to the sender, such as the recipient's spoken name, a data element that is much harder to auto-process.
- 2) In many countries, there are privacy laws or regulations that prohibit disclosure of certain kinds of descriptive information (e.g., text names). Hence, server implementors are encouraged to support DIT structural rules and name forms [LDAPMODELS] as these provide a mechanism for administrators to select appropriate naming attributes for entries. Administrators are encouraged to use these mechanisms, access controls, and other administrative controls, which may be available to restrict use of attributes containing sensitive information when naming entries.
- 3) The LDAP directory service needs to be secured properly for this intended use. [LDAPAUTH] describes a number of considerations that apply in this use. In particular, this service provides unauthenticated, public access to directory data, and as such, it is vulnerable to attacks that redirect the query to a rogue server and offer malicious data.



#### 4. IANA Considerations

Reference RFC 3383 "Internet Assigned Numbers Authority (IANA) Considerations for the Lightweight Directory Access Protocol (LDAP)" [LDAPREG].

##### 4.1. Object Identifiers

IANA has registered an LDAP Object Identifier for use in this technical specification, according to the following template:

Subject: Request for LDAP OID Registration

Person & email address to contact for further information:

Greg Vaudreuil (gregv@ieee.org)

Specification: RFC 4237

Author/Change Controller: IESG

Comments:

The assigned OID will be used as a base for identifying a number of schema elements defined in this document.

##### 4.2. Object Identifier Descriptors

IANA has registered the LDAP Descriptors used in this technical specification, as detailed in the following template:

Subject: Request for LDAP Descriptor Registration Update

Descriptor (vPIM): see comment

Object Identifier: see comment

Person & email address to contact for further information:

GregV@ieee.org

Usage: see comment

Specification: RFC 4237

Author/Change Controller: IESG

Comments:

The following descriptors have been added:

NAME	Type	OID
-----	----	-----
vPIMUser	O	IANA-ASSIGNED-OID.1.1
vPIMRfc822Mailbox	A	IANA-ASSIGNED-OID.2.1
vPIMTelephoneNumber	A	IANA-ASSIGNED-OID.2.2
vPIMSpokenName	A	IANA-ASSIGNED-OID.2.3
vPIMSupportedUABehaviors	A	IANA-ASSIGNED-OID.2.4
vPIMSupportedAudioMediaTypes	A	IANA-ASSIGNED-OID.2.5
vPIMSupportedMessageContext	A	IANA-ASSIGNED-OID.2.6
vPIMTextName	A	IANA-ASSIGNED-OID.2.7
vPIMExtendedAbsenceStatus	A	IANA-ASSIGNED-OID.2.8
vPIMMaxMessageSize	A	IANA-ASSIGNED-OID.2.9
vPIMSubMailboxes	A	IANA-ASSIGNED-OID.2.10

Where Type A is Attribute and Type O is ObjectClass

## 5. References

### 5.1. Normative References

- [LDAP] Hodges, J. and R. Morgan, "Lightweight Directory Access Protocol (v3): Technical Specification", RFC 3377, September 2002.
- [32KADPCM] Vaudreuil, G. and G. Parsons, "Toll Quality Voice - 32 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM) MIME Sub-type Registration", RFC 3802, June 2004.
- [CONTEXT] Burger, E., Candell, E., Eliot, C., and G. Klyne, "Message Context for Internet Mail", RFC 3458, January 2003.
- [E164] CCITT Recommendation E.164 (1991), Telephone Network and ISDN Operation, Numbering, Routing and Mobile Service - Numbering Plan for the ISDN Era.

### 5.2. Informative References

- [VPIMV2] Vaudreuil, G. and G. Parsons, "Voice Profile for Internet Mail - version 2 (VPIMv2)", RFC 3801, June 2004.

- [LDAPREG] Zeilenga, K., "Internet Assigned Numbers Authority (IANA) Considerations for the Lightweight Directory Access Protocol (LDAP)", BCP 64, RFC 3383, September 2002.
- [LDAPAUTH] Wahl, M., Alvestrand, H., Hodges, J., and R. Morgan, "Authentication Methods for LDAP", RFC 2829, May 2000.
- [LDAPMODELS] Zeilenga, K., "LDAP: Directory Information Models" Work in Progress, February 2005.

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