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SERIES F: NON-TELEPHONE TELECOMMUNICATION SERVICES

Message handling services

Service and operational requirements of the voice-mail store-and-forward service

ITU-T Recommendation F.472

(Previously CCITT Recommendation)

ITU-T F-SERIES RECOMMENDATIONS

NON-TELEPHONE TELECOMMUNICATION SERVICES

TELEGRAPH SERVICE	F.1–F.109
Operating methods for the international public telegram service	F.1–F.19
The gentex network	F.20–F.29
Message switching	F.30–F.39
The international telemessage service	F.40–F.58
The international telex service	F.59–F.89
Statistics and publications on international telegraph services	F.90–F.99
Scheduled and leased communication services	F.100–F.104
Phototelegraph service	F.105–F.109
MOBILE SERVICE	F.110–F.159
Mobile services and multidestination satellite services	F.110–F.159
TELEMATIC SERVICES	F.160–F.399
Public facsimile service	F.160–F.199
Teletex service	F.200–F.299
Videotex service	F.300–F.349
General provisions for telematic services	F.350–F.399
MESSAGE HANDLING SERVICES	**F.400–F.499**
DIRECTORY SERVICES	F.500–F.549
DOCUMENT COMMUNICATION	F.550–F.599
Document communication	F.550–F.579
Programming communication interfaces	F.580–F.599
DATA TRANSMISSION SERVICES	F.600–F.699
AUDIOVISUAL SERVICES	F.700–F.799
ISDN SERVICES	F.800–F.849
UNIVERSAL PERSONAL TELECOMMUNICATION	F.850–F.899
HUMAN FACTORS	F.900–F.999

For further details, please refer to ITU-T List of Recommendations.

ITU-T RECOMMENDATION F.472

SERVICE AND OPERATIONAL REQUIREMENTS OF THE VOICE-MAIL STORE-AND-FORWARD SERVICE

Summary

This Recommendation defines the general principles and basic operational requirements of the voice-mail store-and-forward service provided by service providers using computer-controlled voice-mail systems and Voice-mail Store-and-Forward Units (Voice SFU). Although voice-mail system access will be, predominantly, from within the same country in which the Voice SFU is situated, this Recommendation sets out the minimum service requirements that should be fulfilled to allow international extension of the service. International extension of this service is achieved by the interconnection with one or more other Voice SFUs, across national boundaries using automated transit facilities for the purpose of transfer and delivery of voice-mail messages.

Source

ITU-T Recommendation F.472 was prepared by ITU-T Study Group 7 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 9th of August 1997.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the ITU had/had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

Recommendation F.472

SERVICE AND OPERATIONAL REQUIREMENTS OF THE VOICE-MAIL STORE-AND-FORWARD SERVICE

(Geneva, 1997)

1 Scope

This Recommendation defines the general principles and basic operational requirements of the voice-mail store-and-forward service provided by service providers using computer-controlled voice-mail systems and Voice-mail Store-and-Forward Units (Voice SFU). Although voice-mail system access will be, predominantly from within the same country in which the Voice SFU is situated, this Recommendation sets out the minimum service requirements that should be fulfilled to allow international extension of the service. International extension of this service is achieved by the interconnection with one or more other Voice SFUs, across national boundaries using automated transit facilities for the purpose of transfer and delivery of voice-mail messages.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

– ITU-T Recommendation F.471 (1997), *Operational requirements for the interconnection of voice-mail store-and-forward units.*

– ITU-T Recommendation F.400/X.400 (1996), *Message handling: System and service overview.*

– CCITT Recommendation F.440 (1992), *The voice messaging service*.

– CCITT Recommendation X.440 (1992), *Message handling systems: Voice messaging system*.

– CCITT Recommendation G.721 (1990) (See ITU-T Recommendation G.726.)

– CCITT Recommendation G.726 (1990) (Has replaced former CCITT Recs. G.721 and G.723), *40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM).*

– ITU-T Recommendation G.728 – Annex G (1994), *16 kbit/s fixed point specification.*

3 Abbreviations

This Recommendation uses the following abbreviations:

ADPCM	Adaptive Differential Pulse Code Modulation
DEST	Destination
EOS	Elements of Service
Rec.	Recommendation
SFU	Store-and-Forward Unit
VMS	Voice-mail System
VM S&F	Voice-mail Store-and-Forward

3.1 Conventions

The classifications indicated in the tables use the following conventions:

B	BASIC service	On origination, it is automatically provided by the service on behalf of the user, and on receipt it is always available for presentation to a recipient.
E	ESSENTIAL service	The user is always provided a mechanism to set a value (or override a default value) on origination and on receipt it is always available for presentation to a recipient.
A	ADDITIONAL service	The VMS may provide the user with a means to set a value (or override a default) on origination and on receipt the service may be available for presentation to a recipient. The choice of its availability is that of the service provider.

4 Definitions

This Recommendation defines the terms listed below.

NOTE – Use of the terms "delivery", "submission", "transfer", does not imply any specific protocol implementation.

4.1 message delivery: Message delivery is defined as the transfer of voice-mail messages, including responsibility for the message from a Voice SFU to a voice-mail system for the recipient named on the subject message.

NOTE – In the context of this service, the acceptance of responsibility for the message by the voice-mail system constitutes delivery. As a local matter, the voice-mail system may choose to accept responsibility for the message only if it has been deposited into the recipient's mailbox.

4.2 message submission: Message submission is defined as the transfer of voice-mail messages and responsibility for the message from the VMS to its Voice SFU.

4.3 message transfer: Message transfer is defined as the transfer of voice-mail messages and responsibility for the message from one Voice SFU to another Voice SFU via a transfer system.

4.4 recipient address: A recipient address is defined as the ultimate destination of a message. A recipient address may designate a VMS user, a voice-mail terminal or a storage device empowered to receive messages for a VMS recipient. A recipient address may identify a single user or a distribution list.

4.5 transfer system: A transfer system is defined as a system which accomplishes the transfer of voice-mail messages. A transfer system may or may not provide end user services.

4.6 transit facility: A transit facility is either a Voice SFU or a transfer system.

4.7 voice-mail system: The system used to collect/deliver voice messages from/to direct users and subscribers. The voice-mail system may be associated with a Voice SFU. This system consumes the services supplied by its Voice SFU and consumed by its users as described in this Recommendation.

4.8 voice-mail system interface to voice SFU: The service interaction uses an analogue or digital interface between the VMS and its corresponding Voice SFU.

NOTE – The realization of this interface is a local matter but may be the subject of future standardization.

4.9 voice SFU: A Voice SFU identifies the boundary within which the VM S&F service is provided. An administration may control one or more voice-mail store-and-forward units. A Voice SFU is a main component of a VM S&F domain which interacts between a VMS and a transfer system. A Voice SFU must provide the functions of message submission, message delivery to its direct user (a VMS), and in the case of interconnection, consumes the services provided by a transfer service and its correspondent Voice SFU as identified in Recommendation F.471.

4.10 voice signature: The voice signature (e.g. voice back) is a representation of recipient identifier in voice encoding form. It is of variable duration but may support ten seconds duration if required. Voice signature is a networking capability that allows the recipient's name to be spoken when sending or receiving networking messages. Its value is used by the receiving service for rendering by or to the intended recipient associated with the receiving voice-mail system. It is not intended for routing the message between Voice SFUs. It may be associated with a recipient address or an originator address, which constitutes the routeable information for intercommunication between Voice SFUs. The encoding of the information conveyed as a voice signature shall be that of the voice object contained in the subject message. If multiple objects are contained in a single voice-mail message, and these objects contain different encodings, then the encoding of the voice signature is conveyed in the message as part of the protocol that realizes this service. This voice signature element of service shall comply with the voice encodings identified in 7.3/F.471.

NOTE – Signature in this context does not mean a security code.

4.11 messages: Messages are the voice encoded objects exchanged between voice-mail systems. Voice encoded objects contain a digital representation of the originator's spoken, pre-recorded, or otherwise audio generated message. Examples of voice encoded objects may include, spoken language, high fidelity sound, etc. When the voice encoded object is delivered to the intended recipient, irrespective of any transcoding that might occur, it shall retain the same semantics and sound fidelity as the standard of the originator's recording device.

4.12 supporting data: The information necessary for messages to be exchanged between users of voice-mail systems. The primary use of these data is to enable pre-processing of the subject voice encoded object(s) for proper rendering to the intended recipient. Supporting data may include encoding algorithm identifier and corresponding parameters needed for decoding, message duration, subject information, security parameters, etc.

4.13 voice-mail message: The voice-mail message format comprises the message, supporting data, and any other voice-mail message pre-processing details. Abstractly, it consists of an envelope and the envelope contents which is characterized by the elements of service identified in this Recommendation.

5 Introduction

The development and growth of disparate voice store-and-forward equipment and the potential for the international interconnection of such equipment has created the need for a common set of service elements and operational procedures to meet the needs of users. The VM S&F service defined in this Recommendation is designed to meet these needs. As such, this Recommendation defines the VM S&F service to enable the international interconnection of disparate VMS equipment. To facilitate international interoperability, this Recommendation, along with Recommendation F.471, identifies or defines features and procedures for the service in order to promote and assist in the provisioning of such services in many countries.

The VM S&F is comprised of one or more domains where a domain is a logical entity that incorporates at least a single Voice SFU and one or more VMSs, though not indicated in Figure 1.

Figure 1 identifies the scope of both this Recommendation and Recommendation F.471. Furthermore, it identifies the following four (4) points of interaction.

5.1 Interaction between the VMS and its direct user

The interaction point between the VMS and its direct user is identified as "1" in Figure 1. The direct user consumes the services of the VMS identified in this Recommendation. The concrete realization of support for these services by a VMS is considered to be a local matter.

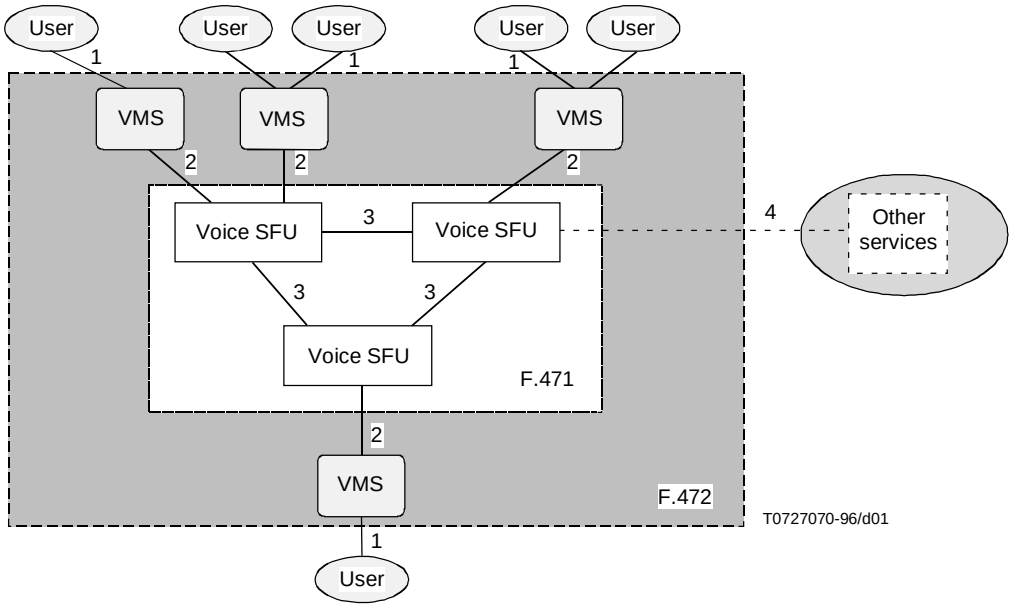


Figure 1/F.472 – VM S&F services

5.2 Interaction between a Voice SFU and its direct user (i.e. VMS)

The interaction point between a Voice SFU and its direct user is identified as "2" in Figure 1. The direct user consumes the services of a Voice SFU identified in this Recommendation. The concrete realization of support for these services by a Voice SFU is considered to be a local matter.

5.3 Interaction between Voice SFUs

The interaction point between Voice SFUs is identified as "3" in Figure 1. It is understood that the intercommunication of Voice SFUs employs a transfer mechanism, such as the message transfer service specified in Recommendation F.410. A Voice SFU consumes transfer services as well as the services provided by its correspondent Voice SFU as identified in Recommendation F.471. The concrete realization of support for these services by a Voice SFU is considered to be a local matter.

5.4 Interaction between a Voice SFU and direct users of other services

The interaction point between a Voice SFU and an indirect user who is a direct user of another service is identified as "4" in Figure 1. The indirect user through its association with other services may consume all or some of the services identified in this Recommendation for direct users. The concrete realization of support for these services may be the subject of future standardization.

6 Service description

6.1 Technical requirements

Technical requirements of the service are covered in other publications, e.g. in the relevant G- and X-Series Recommendations.

6.2 Accounting and settlement

Accounting and settlement aspects are covered in D-Series Recommendations. Voice SFUs shall record and store sufficient information for charging and settlement of accounts, when applicable.

6.3 Operational aspects

The operational aspects of the interconnection of Voice SFUs are covered in Recommendation F.471. Quality of service aspects for VM S&F are covered in clause 10.

6.4 Interworking

The interworking between the VM S&F service and other ITU-T defined services is for further study.

6.5 Message submission

Users submit messages to a VMS which in turn submits messages to the Voice SFU for delivery to one or more recipients. The VM S&F service provides a range of service elements which may be used by the VMS and its users for message management purposes, for example:

- Service elements such as class of message delivery and deferred delivery request allow the VMS to specify how messages are handled in their transmission from source to destination.
- Other service elements, such as voice-mail notifications, may provide the VMS with more extensive message statistics than are generally available in a real-time service, e.g. see clause 7/F.471.

The service shall accept messages submitted in an agreed voice message format. Acceptance of messages in other formats is *optional* and subject to bilateral agreement.

6.6 Access to the service

The VM S&F service may be accessed by a variety of network access devices, such as telephone hand sets or computer oriented terminal devices over a variety of networking technologies. User access to a VM S&F service will be predominantly through a proprietary VMS connected to its associated national public networks. Access may also be provided by local mechanisms defined independent of public networks.

6.7 Service interconnection

Where the service is provided by means of the interconnection by two or more service providers interworking between Voice SFUs is as defined in Recommendation F.471. Interworking using the voice message encoding defined for 32 kbit/s in Recommendation G.726 is *mandatory*. Interworking using other encodings such as G.728, or proprietary encodings is *optional* and subject to bilateral agreements.

7 Service elements

7.1 Voice message format service elements

The provision of service elements by a VMS is a local matter and may vary between service providers. However, service providers extending their service across international boundaries by interconnection with one or more Voice SFUs should regard support for the voice message format service elements defined in Annex A as indicated in Table 1.

7.1.1 Message deferral services

Message deferral relates to two elements of service, *deferred delivery request* and *cancel deferred delivery request.* How message deferral services are concretely realized is a local matter.

Message submission may be deferred by two mechanisms in context of the *Deferred Delivery Request element of service:*

a) Deferred to a time specified by the originator.

b) Deferred to a time determined by the service provider.

NOTE 1 – In a) the voice-mail system may choose any of the classes of delivery supported to take effect at the specified time.

NOTE 2 – Deferral b) is only provided when a voice-mail system has selected the non-urgent class of delivery.

Table 1/F.472 – Voice message format service elements

Element of service	Originate	Receive	EOS
Cancel deferred delivery request	A	N/A	A.1
Class of message delivery	E	B	A.2
Deferred delivery request	A	N/A	A.3
Message identification	B	B	A.4
Message recipient	E	B	A.5
Originator identification	B	B	A.6

7.1.2 Voice message identification

This element of service enables cooperating voice messaging user agents to convey a globally unique identifier to each voice message sent or received. The voice message identifier is composed of an originator/recipient name of the originator and an identifier that is unique with respect to that name. A voice messaging user agent and user use this identifier, optionally together with message creation time, to refer to a previously sent or received voice message (for example, in receipt notifications.)

7.2 Classification of VM S&F service elements

Additionally, VM S&F service feature considerations for international communication are also characterized as service elements and are explained in 7.2 and Table 2. In this table the inference of B, E and A is slightly different as the classification implies both origination and receipt.

Table 2/F.472 – Classification of VM S&F service elements

Service elements	Classification	Subclause reference
Access management	B	7.2.1
Message recipients:	E	7.2.2
• Single address message;	E	7.2.2.1
• Multiple address message;	A	7.2.2.2
• Distribution list identifier.	A	7.2.2.3
Class of message delivery	A	7.2.3
Voice-mail notifications:	A	7.2.4
• Successful message transfer notifications (positive Level 1);	B	7.2.4.1
• Unsuccessful message transfer notifications (negative Level 1);	B	7.2.4.2
• Successful message delivery notification (positive Level 2);	B	7.2.4.3
• Unsuccessful message delivery notification (negative Level 2).	B	7.2.4.4
Voice encoding conversion	A	7.2.5

7.2.1 Access management

Access management is the responsibility of the originating voice-mail system. It includes the identification and validation that the direct user of the voice-mail system is authorized to use its services. This may be achieved by passwords where pre-registration is involved. In cases where pre-registration is not employed, the identification of the originating voice-mail system may be achieved through the transfer of automatic number identification data from the access network to the Voice SFU. Where passwords are used, it should be possible for the voice-mail system to change the password periodically. The exact procedures for security of access should be a local matter.

7.2.2 Message recipient

The message recipient element of service requires service providers to provide a mechanism for users to identify the intended recipient(s) for a message. The recipient identifier conveys the identity of the recipient in a routeable representation, i.e. the address, and optionally a voice signature. The method of specifying the recipient address is a local matter. The form of this address may include an E.164 number and/or a domain component. Voice-mail messages may be addressed to a single recipient, multiple recipient or distribution list.

The Voice SFU supporting the originator may need to convert the canonical form of the address as created on the originating voice-mail system to one of a form used by the transit service for intercommunication between Voice SFUs. The receiving Voice SFU may need to convert the received address into the canonical form used by the voice-mail system. In such cases, the recipient address as created in the originating voice-mail system shall be preserved and returned in any notifications related to the subject message.

7.2.2.1 Single address message

A single address message is a message with one recipient address and optionally as voice signature.

7.2.2.2 Multiple address message

A multiple address message is a message which is addressed to more than one recipient. VM S&F service shall be able to accommodate a single message addressed to at least 256 recipients.

7.2.2.3 Distribution list identifier

A distribution list identifier is used to reference a pre-registered list of recipient addresses. A voice-mail system may use a distribution list identifier at the time of message submission. Distribution list may be supported by the originating or receiving voice-mail system.

NOTE – This Recommendation does not assume that there is any distinguishable difference between the name of a single recipient address format and the name of a distribution list.

7.2.3 Classes of message delivery

Two classes of message delivery are defined for this service:

a) urgent;

b) routine.

The process by which the class of message delivery is selected should be a local matter. Quality of service objectives for the above classes of delivery are shown in 10.2, Table 3.

7.2.4 Voice-mail notifications

Message status information is exchanged in VM S&F Level 1 (message transfer notification) and Level 2 (message delivery notification) notifications whose EOSs are described in Recommendation F.471 and Annex A. The information provided by these two notifications are described in 7.2.4.1 through 7.2.4.4. Both Level 1 and 2 notifications shall be generated on a per recipient basis.

The presentation of the content of Levels 1 and 2 notifications and the handling of multiple address reports is a local matter. The method of delivery and alert of an existence of a notification is a local matter, e.g. forced – voice message or queried – delivery. Message submission is employed for Level 2 notifications.

7.2.4.1 Successful message transfer notification (positive Level 1 notification)

The **successful message transfer notification** reports to the originator the successful transfer and acceptance of responsibility of a message to the receiving Voice SFU associated with an intended recipient. Depending upon the message acceptance policy of the destination VMS:

- the notification may be automatically generated immediately on *message delivery* by the accepting Voice SFU on behalf of its associated VMS based on some locally determined criteria; or
- the notification may be automatically generated after the VMS associated with the receiving Voice SFU has accepted responsibility for the subject message based on some locally determined criteria.

In either case, it conveys the semantics that responsibility for the message has been transferred to the receiving Voice SFU.

Level 1 successful transfer notifications shall provide at least the following information:

- message reference;
- recipient address;
- time of delivery to recipient address.

NOTE – Provision of time zone indication is a local matter although UTC is recommended.

7.2.4.2 Unsuccessful message transfer notification (negative Level 1 notification)

The **unsuccessful message transfer notification** reports to the originator the failure to transfer a message to the receiving Voice SFU associated with an intended recipient. This notification is automatically generated by the service if the Voice SFU fails to accept responsibility for the subject message. Depending upon the message acceptance policy of the receiving VMS:

1) the notification may be automatically generated immediately on *message delivery* by the rejecting Voice SFU (and its associated transfer system) on behalf of its associated VMS based on some locally determined criteria; or
2) the notification may be automatically generated after the VMS associated with the receiving Voice SFU signals non-acceptance of responsibility for the subject message based on some locally determined criteria.

Level 1 unsuccessful delivery notifications shall provide at least the following information:

- message identification;
- notification originator identification;
- original message recipient indication (as submitted by the originator);
- date and time of failure;
- failure reason and diagnostic information.

NOTE 1 – Provision of time zone indication is a local matter, although UTC is recommended.

NOTE 2 – Unsuccessful message transfer notifications do not need to be requested by the originator because the service always generates one on a per recipient basis if delivery to the destination Voice SFU fails.

NOTE 3 – The service is provided by the transfer system associated with the destination Voice SFU.

7.2.4.3 Successful message delivery notification (positive Level 2 notification)

A **successful message delivery notification** reports to the originator the service's success in delivering a message from the Voice SFU to the voice-mail system which serves the intended recipient as further qualified in 7.2.2/F.471. This notification is only generated if requested by the originator. The report to the service may provide **at least** the following information:

- message identification;
- notification originator identification;
- original intended message recipient;
- receiving terminal identification;

- message duration;
- delivery duration;
- date and time of responsibility acceptance.

NOTE 1 – Provision of time zone indication is a local matter although UTC is recommended.

NOTE 2 – Receiving terminal identification, message duration, and delivery duration are as defined in Recommendation F.440.

7.2.4.4 Unsuccessful message delivery notification (negative Level 2 notification)

A **negative message acceptance notification** reports to the originator the failure to deliver a message from the Voice SFU to the voice-mail system which serves the intended recipient. The notification is always generated by the Voice SFU whenever the destination VMS fails to accept responsibility for the subject message. The local message acceptance policy is used to determine the basis for the rejection. For example, possible reasons for not accepting responsibility for the message is the message's address does not actually identify a user of that VMS, or the voice-mail system cannot place the message into the recipient's mailbox, e.g. box full or locked, or the message is forwarded to another user, etc.

Level 2 notifications shall provide at least the following information:

- message identification;
- notification originator identification;
- original intended message recipient (as submitted by the originator);
- date and time of failure;
- failure reason and diagnostic information;
- time last attempted;
- number of attempts;
- delivered message duration.

NOTE 1 – Provision of time zone indication is a local matter, although UTC is recommended.

NOTE 2 – Negative Level 2 notifications do not need to be requested by the originator because the service always generates one on a per recipient basis if delivery to the destination Voice SFU fails.

NOTE 3 – *Time last attempted*, *number of attempts*, and *delivered message duration* are as defined in Recommendation F.440.

7.2.5 Voice message encoding conversion

The conversation service facility enables a message to be converted from one speech encoding to another, e.g. G.711 to G.726 conversion. If a Voice SFU supports speech encoding other than 32K ADPCM defined in Recommendation G.726, then it shall support conversion between Recommendation G.726 and that format. The conversion should be an automatic facility and should not require additional procedures for users.

NOTE – Some conversions may result in a loss of information and degrade intelligibility of the message. Such conversions should be avoided. For example, Recommendation G.728 (16K LD-CELP) to G.726 (32K ADPCM) may result in as loss of information.

8 Access procedures

Access procedures are a local matter. However, the service provider should make provision for security of access, message recipient indication delivery information and message submission integrity.

9 Message delivery procedures

The following procedures are provided for provisioning the message delivery functionality.

9.1 Automatic call retry

When a Voice SFU attempts to deliver a message to the destination voice-mail system, procedures for automatic call retry on system or terminal busy, ringing no reply or incomplete calls (subject to national policy and interworking agreements) should be provided. Where the service is extended across national boundaries for the delivery of messages, then the target delivery times specified in clause 10 should be considered when setting the call retry periods.

9.2 Call records

A call record that captures the successful or unsuccessful acceptance of responsibility of the subject message by recipient should be maintained by the voice-mail system. The call record information should include, as a minimum, the relevant information provided by notifications. The storage and format of call records is a local matter.

NOTE – The intended purpose for call records is accounting and settlement.

9.3 Recovery from interrupted message delivery

If the transfer of a voice-mail message or notification is interrupted during the delivery from the destination Voice SFU to the destination voice-mail system, subsequent attempt to deliver the message should commence with the start of the voice-mail message not successfully delivered. If the transfer of the message was interrupted during the transfer of the message from the voice-mail system to the recipient's terminal device, subsequent attempts to deliver the message shall commence with the start of the message not successfully delivered. Redelivery should be attempted as soon as possible to minimize user confusion and dissatisfaction.

10 Quality of service

10.1 Message loss or failure

The introduction of a Voice SFU for communication between voice-mail systems should not increase, on a per address basis, the probability of message loss or corruption.

In the event of system failure, all messages accepted by the originating Voice SFU should be traceable. Furthermore, if the following conditions occur, then procedures are to be invoked as indicated:

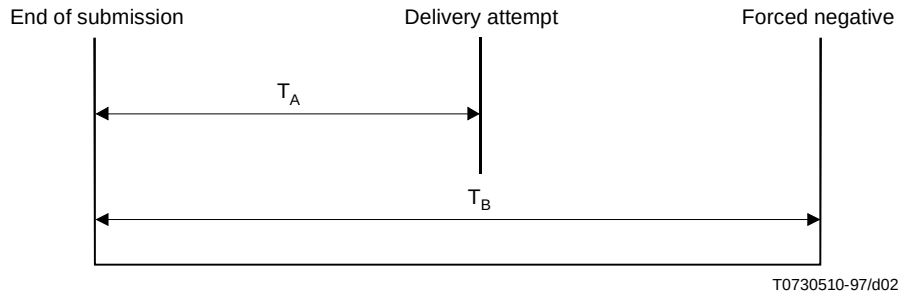
- If messages with deferred delivery have to be cancelled by the originating Voice SFU because of system failure, an **unsuccessful message transfer notification (Level 1)** is to be generated to the originator of the cancelled message as part of system shutdown or system restart if the pending message cannot be recovered.
- If system failure occurs at the destination Voice SFU, an **unsuccessful message transfer notification (Level 1)** is to be generated to the originator indicating system failure.
- If failure occurs in the destination voice-mail system prior to the user accepting responsibility for the subject message, then:
  - as part of system shutdown, then an **unsuccessful message delivery notification (Level 2)** is to be generated as part of the shutdown procedures; and
  - subsequent to system restart, an **unsuccessful message delivery notification** is to be sent to the message originator indicating an appropriate reason.

10.2 Quality of service targets

When the service is extended across international boundaries for delivery purposes, it is recommended that the Voice S&F design be such that the end-to-end quality of service targets is that established in Table 3 as illustrated in Figure 2.

The Voice S&F should be capable of meeting the quality of service targets at least 95% of messages received during any one hour period 95% of the time.

While delivery is being attempted, the Voice S&F may generate interim notifications to the voice-mail system showing that delivery of the message is still outstanding.



T_A Time from the end of submission of the message or the time specified for deferred delivery to the start of the first call attempt.

T_B Time from the end of submission of the message or the time specified for deferred delivery to the forced generation of a negative 2nd level notification and termination of message delivery attempt (unless transmission has already commenced).

Figure 2/F.472 – Illustration of quality of service times

Table 3/F.472 – Quality of service targets

Class of message delivery	T_A	T_B
Urgent	0.5 hours	1 hour
Routine	2 hours	4 hours

10.3 Storage capacity

Storage capacity will vary from one Voice SFU to another according to the volume of traffic. However, sufficient storage capacity should be provided to cater for an average message size of two minutes, and maximum message size of five minutes.

10.4 Public network circuits

10.4.1 Provision

The provision of network circuits for the reception and delivery of traffic by the Voice SFU will vary between service providers. However, sufficient outgoing public network circuits should be provided to meet the quality of service targets of 10.2.

10.4.2 Performance

Service providers should make observations to evaluate the performance of the Voice SFU to ensure, in particular, that public network provisions are such that quality of service targets of 10.2 are being achieved.

10.5 Duration of the service

The VM S&F service should be continuously available.

10.6 Inquiries and complaints

User inquiry and complaint support services should be provided to VMS operators by service providers. VMS users should address any complaints to the OAM&P group providing them with the VM S&F service.

Annex A

Format element of service definitions

A.1 cancel deferred delivery request: The *cancel deferred delivery request* element of service enables the user to indicate to the service the desire to cancel a message being held for deferred delivery.

A.2 class of message delivery: The *class of message delivery* element of service enables the user to indicate to the service the desired grade of transfer and delivery for a submitted message. The underlying communications mechanisms interpret this information to provide delivery in accordance with the originator's requested transfer and delivery performance times indicated in Table 2.

NOTE – Voice-mail notifications use the value of *class of message delivery* indicated in the original subject message as the value in the notification.

A.3 deferred delivery request: This element of service allows the originator to request that the message be held locally for submission at a point in the future. The realization of this service is a local matter.

Provisioning of this service requires the provisioning of element of service A.1 – cancel deferred delivery request.

NOTE – It functions as the deferred delivery element of service of F.400 (B.19), but is not defined in terms of UA and MTA which are functional entities in the message handling service.

A.4 message identification: A message identification element of service is provided by VM S&F to unambiguously identify a message related to the message originator on a global basis.

NOTE – The value is returned in notifications to enable the user to correlate the received notification with the appropriate previously submitted message.

A.5 message recipient: A message recipient element of service identifies the one or more intended recipients for this message. It may also identify a distribution list which is named like any other recipient.

NOTE 1 – All recipients are considered to be primary recipients.

NOTE 2 – The notion of blind copy or copy recipients are not featured in this service.

A.6 originator identification: This element of service allows the identity of the originator to be conveyed to the recipient. The intent of this element of service is to identify the originator in a user-friendly way. It includes a routeable representation of the originator's name, and may include a voice signature as well.

A.7 notification details: This element of service allows the originator to convey to the recipient the details associated with a Level 1 or Level 2 notification. The intent of this element of service is to identify the originator in a user-friendly way details associated with the successful acceptance or rejection of a voice-mail message. It includes date and time information, and an indication of acceptance or rejection (and *why* if rejected.)

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