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User-Defined Errors for RSVP

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Abstract

The Resource ReserVation Protocol (RSVP) defines an ERROR_SPEC object for communicating errors. That object has a defined format that permits the definition of 256 error codes. As RSVP has been developed and extended, the convention has been to be conservative in defining new error codes. Further, no provision for user-defined errors exists in RSVP.

This document defines a USER_ERROR_SPEC to be used in addition to the ERROR_SPEC to carry additional user information related to errors.

0. Changes Since Last Revision

[This section to be removed before publication as an RFC.]

- Clarify 'Enterprise Number'.
- Clarify 'Error Description' and give reference for ASCII.

1. Introduction

The Resource ReserVation Protocol (RSVP) [RFC2205] defines an ERROR_SPEC object for communicating errors. That object has a defined format that permits the definition of 256 error codes. As RSVP has been developed and extended, the convention has been to be conservative in communicating errors. Further no provision for user defined errors exists in RSVP.

When developing extensions to RSVP, it is often useful for those implementing to define error messages to aid both in the initial debugging and in testing against older versions or other implementations.

This document defines a new RSVP object to permit user-defined errors to be communicated. This will enable organizations to define errors which they can use for internal development. These error values could also be shared with the community at large to aid in promoting interoperability between diverse implementations.

RSVP PathErr and ResvErr messages require the presence of an ERROR_SPEC object ([RFC2205]). [RFC3473] defines the Notify message that also requires the presence of an ERROR_SPEC object. In order to not change the mandatory contents of these messages, this document defines a new error code value that indicates that the new object is present and carries a user-defined error code.

Note that the ResvConf message defined in [RFC2205] also carries an ERROR_SPEC object. But this usage of the object does not carry meaningful Error Codes or Error Values and so the extensions defined in this document are not applicable to that message.

1.1. Conventions

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 RFC 2119 [RFC2119].

2. User-Defined Error

A new Error Code is defined for use in an ERROR_SPEC object.

Error Code = <tba-xxx>: User Error Spec

This error code is used to signal the presence of a USER_ERROR_SPEC. One Error Value is defined as follows.

Error Value 0 = Further details in User Error Spec

Further error values may be defined in future specifications.

When sending this error code, a USER_ERROR_SPEC object MUST be included in the PathErr, ResvErr, or Notify message.

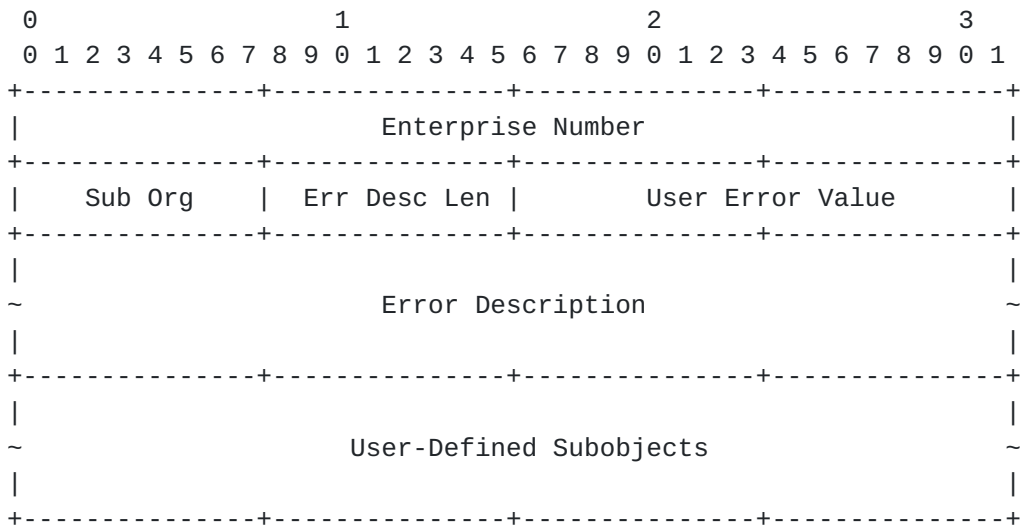
[RFC Editor's note: <tba-xxx> = to be assigned by IANA as per Section 5. Please replace <tba-xxx> with the number assigned by IANA and remove this note.]

3. USER_ERROR_SPEC Class

A new RSVP object class called USER_ERROR_SPEC is defined. To support backwards compatibility, its class number is in the range 192-247. As defined in [RFC2205], implementations that do not understand such an object will forward it unmodified.

USER_ERROR_SPEC object: Class = <tba-yyy>, C-Type = 1

[RFC Editor's note: <tba-yyy> = to be assigned by IANA as per Section 5. Please replace <tba-yyy> with the number assigned by IANA and remove this note.]



Enterprise Number

A unique identifier of an organization encoded as a 32-bit integer. Enterprise Numbers (sometimes known as Private Enterprise Numbers) are assigned by IANA and managed on a first come first served basis through the IANA registry named "Enterprise Numbers" [RFC2578].

Sub Org

A unique identifier of an organization encoded as an 8-bit integer. An organization MAY use this field to create independent Error Value spaces. This is intended to facilitate teams which are doing parallel development. If independent spaces are not required, this field SHOULD be set to zero.

Err Desc Len

The length of the error description in the Error Description field in bytes excluding any padding. Zero is a valid length if no error description is supplied.

User Error Value

A 16-bit integer. The meaning is specified by the (sub-)organization indicated by the Enterprise Number and Sub Org fields.

Error Description

A string of characters in US-ASCII [ASCII] padded with nulls (0x00) to a multiple of 4 bytes. If the Err Desc Len is zero then no bytes are supplied.

Note that the content of this field is implementation-specific. It is typically printable, but might not be shown to all users in all implementations (because it is limited to US-ASCII). Therefore, the content of the field SHOULD be limited to supplementary information and SHOULD NOT contain information critical to operating the network. Criticial information is present in the User Error Value field.

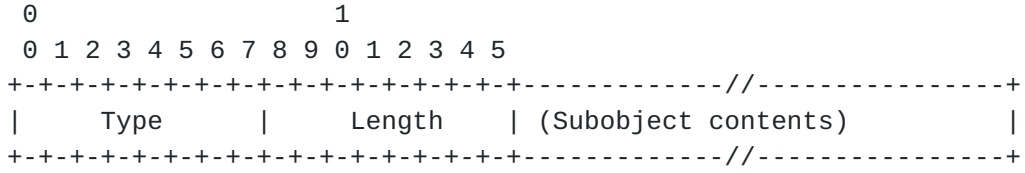
User-Defined Subobjects

User-defined subobjects MAY be included. The generic format of subobjects is specified in Section 3.1. The semantics of a subobject is indicated by the Type field, but the semantics, format and contents of the Value field are specified by the

(sub-)organization indicated by the Enterprise Number and Sub Org fields of this object.

3.1. Subobjects

Each subobject is encoded as a TLV in the following format:



Type

An 8-bit number assigned by the the (sub-)organization indicated by the Enterprise Number and Sub Org fields of the USER_ERROR_SPEC object.

Length

The Length contains the total length of the subobject in bytes, including the Type and Length fields. The Length MUST be at least 4, and MUST be a multiple of 4.

4. Procedures for Using the User Error Spec

4.1. Procedures for Sending the User Error Spec

A USER_ERROR_SPEC object MAY be included in any PathErr, ResvErr, or Notify message for any defined error code. The Enterprise Number MUST be a valid value assigned by IANA from the "Enterprise Numbers" registry.

As specified in [RFC2205] and [RFC3473], an ERROR_SPEC object with a valid error code MUST be included in all PathErr, ResvErr, and Notify messages. This rule is not changed by these procedures even when a USER_ERROR_SPEC object is included. If no other error code applies, the Error Code in the ERROR_SPEC object MUST be set to "User Error Spec" as defined in Section 2 of this document. When the Error Code in the ERROR_SPEC object is set to "User Error Spec", the Error Value sub-code SHOULD be set to "Further details in User Error Spec" as defined in Section 2, but further Error Value sub-codes may be defined in future specifications.

4.2. Procedures for Receiving the User Error Spec

It is RECOMMENDED that implementations that receive a PathErr, ResvErr, or Notify message carrying a USER_ERROR_SPEC object at a minimum log the Enterprise Number, Sub-organization, User Error

Value, and Error Description. Note that the Error Description is provided in US-ASCII which means that it might not be suitable for display of logging in all systems. Implementations capable of interpreting the contents of the USER_ERROR_SPEC object should take further action based on the reported error.

If a message is received containing an ERROR_SPEC object using the "User Error Spec" error code, but not containing a USER_ERROR_SPEC object, the message MUST be treated as malformed and handled according to [RFC2205].

Implementations SHOULD ignore repeated occurences of USER_ERROR_SPEC objects, and SHOULD forward them unchanged on any messages that they forward. This provides for forward compatiblity.

Implementations receiving a USER_ERROR_SPEC object on some message other than a PathErr, ResvErr, or Notify message MUST treat the error as a malformed message and process according to [RFC2205].

5. IANA Considerations

5.1. RSVP Error Codes

This document makes the following assignments from the RSVP Error Codes and Globally-Defined Error Value Sub-Codes registry (pending IANA action):

Error Code	Meaning
<tba-xxx>	User Error Spec

One Error Value sub-code is defined for use with this Error Code as follows:

0 = Further details in User Error Spec

5.2. RSVP Objects

This document makes the following assignments from the RSVP Class Names, Class Numbers, and Class Types registry (pending IANA action):

Number Space	Value	Name
Class Numbers	<tba-yyy>*	User Error Spec
Class Type	1	User-Defined Error

* Assignment is requested from the range 192 through 247

6. Security Considerations

This document makes no changes to the basic message exchanges of [RFC2205] and [RFC3473]. It will result in a small increase in the number of error messages sent in cases where messages were previously silently dropped due to the lack of an appropriate error code.

The mechanisms defined in this document may be used by implementations to report additional error conditions and information arising from security issues and attacks on the RSVP network.

7. Acknowledgments

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8. References

8.1. Normative References

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

[RFC2205] Braden, R., Zhang, L., Berson, S., Herzog, S., and S. Jamin, "Resource ReSerVation Protocol (RSVP) -- Version 1 Functional Specification", RFC 2205, September 1997.

[RFC3473] Berger, L., "Generalized Multi-Protocol Label Switching (GMPLS) Signaling Resource ReserVation Protocol-Traffic Engineering (RSVP-TE) Extensions", RFC 3473, January 2003.

[ASCII] American National Standards Institute, "USA Code for Information Interchange", ANSI X3.4, 1968.

8.1. Informative References

[RFC2578] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.

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