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iCalendar Real-time Interoperability Protocol (iRIP)

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Abstract

This document specifies a binding from the iCalendar Transport-independent Interoperability Protocol [ITIP] to a real-time transport. Calendaring entries defined by the iCalendar Object Model [ICAL] are composed using constructs from [RFC-2045], [RFC-2046], [RFC-2047], [RFC-2048] and [RFC-2049].

This document is based on the calendaring and scheduling model defined by [ICMS].

This document is based on discussions within the Internet Engineering Task Force (IETF) Calendaring and Scheduling (CALSCH) working group. More information about the IETF CALSCH working group activities can be found on the IMC website at http://www.imc.org, the IETF website at http://www.ietf.org/html.charters/calsch-charter.html. Refer to the references within this document for further information on how to access these various documents.

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1. Introduction

This binding document provides the transport specific information necessary convey iCalendar Transport-independent Interoperability Protocol [ITIP] over a real-time transport.

1.1 Related Memos

Implementors will need to be familar with several other memos that, along with this memo, form a framework for Internet calendaring and scheduling standards.

This document - specifies an Internet email binding for [ITIP].

[ICMS] - specifies a common terminology and abstract;

[ICAL] - specifies a core specification of objects, data types, properties and property parameters;

[ITIP] - specifies an interoperability protocol for scheduling between different implementations;

[IMIP] - specifies a messaging-based protocol binding for [ITIP].

This memo does not attempt to repeat the specification of concepts or definitions from these other memos. Where possible, references are made to the memo that provides for the specification of these concepts or definitions.

1.2 Formatting Conventions

The mechanisms defined in this memo are defined in propose. In order to refer to elements of the calendaring and scheduling model, core object or interoperability protocol defined in [ICMS], [ICAL] and [ITIP] some formatting conventions have been used.

Calendaring and scheduling roles defined by [ICMS] are referred to in quoted-strings of text with the first character of each word in upper case. For example, "Organizer" refers to a role of a "Calendar User" within the scheduling protocol defined by [ITIP]

Calendar components defined by [ICAL] are referred to with capitalized, quoted-strings of text. All calendar components start with the letter

"V". For example, "VEVENT" refers to the event calendar component, "VTODO" refers to the to-do calendar component and "VJOURNAL" refers to the daily journal calendar component.

Scheduling methods defined by [ITIP] are referred to with capitalized, quoted-strings of text. For example, "REQUEST" refers to the method for requesting a scheduling calendar component be created or modified, "REPLY" refers to the method a recipient of a request uses to update their status with the "Organizer" of the calendar component.

Properties defined by [ICAL] are referred to with capitalized, quoted-strings of text, followed by the word "property". For example, "ATTENDEE" property refers to the iCalendar property used to convey the calendar address of a calendar user.

Property parameters defined by [ICAL] are referred to with lower case, quoted-strings of text, followed by the word "parameter". For example, "VALUE" parameter refers to the iCalendar property parameter used to override the default data type for a property value.

2. Architecture

The goal of iRIP is to enable real-time interoperability between scheduling systems using the iCalendar [ICAL] format for information exchange. iRIP is designed primarily to allow Calendar Services (CS) as defined in [ICSM] to forward real-time requests on behalf of Calendar User Agents (CUA). The goal of iRIP is to allow two or more CS's to establish connections between them and operate as a single Calendar Domain.

iRIP allows a CS to initiate a session and perform operations on behalf of multiple CUA's without the need to reauthenticate the session for each CUA.

The design of iRIP does not preclude its use from CUA directly to CS, however. iRIP does not support client access functions such as calendar browsing, retrieval and search. These requirements will be addressed by the Calendar Access Protocol (CAP).

Terms used in the following discussion include:

. the User, the CU that initiates a request.
. the Sender, the agent used to contact a receiving device, send commands, and receive replies, and
. the Receiver, the agent that accepts commands and sends replies.

The Sender and Receiver can take on varying roles of CUA and CS as described in [ICMS].

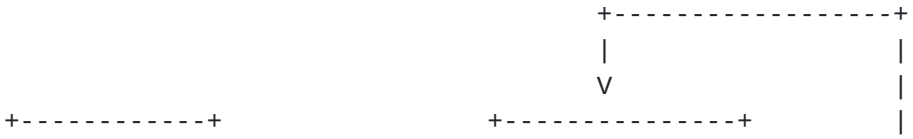
iRIP allows two CS's to establish different levels of trust so that scheduling operations can be performed as efficiently as possible. When an iRIP connection is first established, both parties to the connection authenticate one another using the AUTHENTICATE command. The Sender can then initiate commands which the Receiver MUST interpret relative to the Sender's access control. If proxy operations are required, then an authentication that supports both the authorization user id and authentication user id must be used.

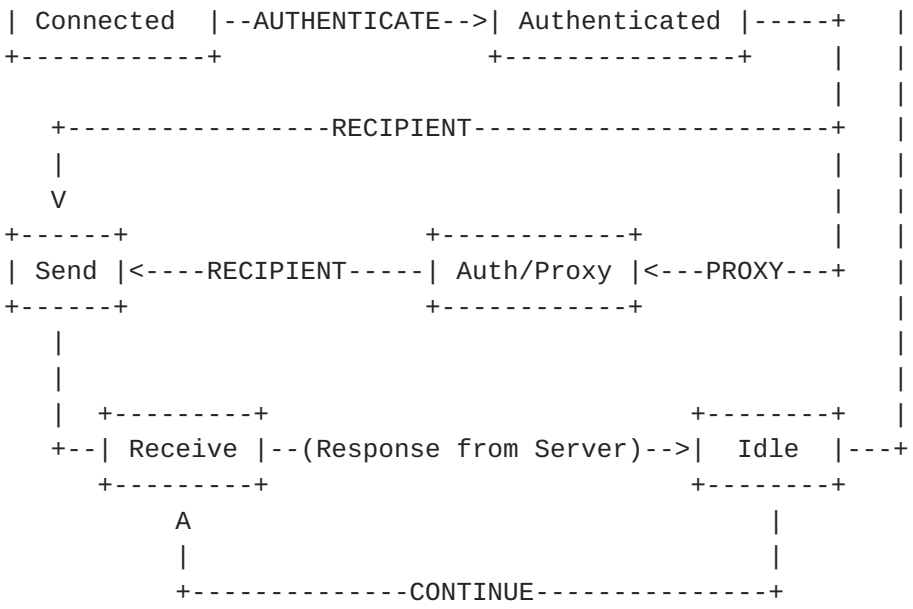
2.1 State Diagram

An iRIP session begins when a TCP/IP connection is made on port 5228. The protocol begins in the Connected state. The AUTHENTICATE command, when successful, begins the Authenticated state. From the Authenticated state, the sender can initiate a request using the RECIPIENT command. The Sender can then issues as many RECIPIENT commands as the operation in progress requires until sending an ICALDATA command. After issuing

the ICALDATA command, the Sender must wait for a response from the receiver. The Receiver can respond that the request has been completed or that the request could not be completed in the time specified by the Sender. When the Receive has ended, the Sender returns to the Authenticated state where another request can be initiated.

>From the Authenticated state, the Sender can issue a PROXY command to indicate that the following command is being performed on behalf of another party. After the PROXY command succeeds and the send and receive are accomplished, the PROXY information is cleared and the Sender returns to the Authenticated state.





2.2 Bounded Latency

iRIP is designed so that the Sender can either obtain an immediate response from a request or discover within a known amount of time that the request cannot be completed. When the Sender initiates a command that the Receiver cannot complete within a given amount of time, the Receiver can return an error code to the Sender indicating this condition. The Sender then issues either a CONTINUE or ABORT command. The ABORT command immediately terminates the command in progress. The CONTINUE command instructs the Receiver to continue processing the command. The ABORT command causes the Receiver to discard the current command and return to the Authenticated state.

3. Commands

In the examples below, lines preceded with "S:" refer to the Sender and lines preceded with "R:" refer to the Receiver.

3.1 ABORT

The ABORT command is issued by the Sender to stop an ICALDATA request from being processed further. When the latency time is specified on the ICALDATA command, the Receiver must issue a reply to the Sender within

the specified time. The reply may be a reply code indicating that the server has not yet processed the request. The Sender must then tell the server whether to continue or abort.

Example:

```
...
S: ICALDATA:10
R: 3.5.4 Start ICAL input; end with <CRLF>.<CRLF>
S: Content-Type:text/calendar; method=REQUEST; charset=US-ASCII
S: Content-Transfer-Encoding: quoted-printable
S:
S: BEGIN:VCALENDAR
S: ...
S: END:VCALENDAR
S: .
<after 10 seconds...>
R: .
R: 3.5.0  Reply Pending
S: ABORT
R: 2.5 OK
```

3.2 AUTHENTICATE

The authentication mechanism used in iRIP is based on [SASL]. This allows the iRIP senders and receivers to dynamically negotiate authentication and encryption mechanisms. SASL defines authentication methods such as ANONYMOUS and encapsulates concepts of PROXY used in iRIP.

The AUTHENTICATE command is used by the client to identify itself to the server. Authenticate is required before any other command can be used and must be the first one sent following the server's welcome message. The format of the command is of the following:

AUTHENTICATE <mechanism> <initial data>

from which the standard SASL interchange will take place as defined in the SASL profile.

Example of an authentication session:

```
R: Welcome IRIP Server
S: AUTHENTICATE KERBEROS_V4 744RTU3r#
S: sfdkjgs;lfdjg s;ldfkj gslkfdjgwrt949jsl4ns.dlngsdf
S: slkfjgsdlfjg;dslfjgdsfg
S: ;lasfgsdfg  45243 z!$14325dc
R: OK Kerberos V4 authentication successful
```

3.2.1 Authentication with Proxy Access

The proxy mechanism is the ability to have data posted from through an indirect source. To handle this requirement, SASL mechanisms have a separate _Authentication_ and _authorization_ identity. Thus, server A could authenticate to server B using server A's credentials with the authorization identity of user X. This effectively allows PROXY operations between servers. Some older SASL mechanisms do not support both authentication and authorization and therefore can't be used when PROXY operations are required. As per the SASL profile, the authorization identity is the one used to determine if the operation should be allowed or not. The authentication identity ensures the transaction is originating from a trusted sender.

3.2.2 Authentication for Anonymous Access

SASL defines an ANONYMOUS authentication mechanism that must be used if anonymous access is to be implemented by an iRIP capable server. This is done by using the standard SASL authentication method and requesting the ANONYMOUS mechanism. The mechanism consists of a single message from the client to the server. The client sends optional trace information in the for of a human readable string. It is recommended that the trace information take one of three forms: An [RFC-822] Internet e-mail address, an opaque ASCII string wich does not contain the _@_ character and can be interpreted by the system administrator of the client's domain or nothing.

The following is an example of anonymous access using an opaque ASCII string:

```
R: <listen on TCP port 5228>
S: <establish a connection to TCP port 5228>
R: 2.2 AboutTime iRIPServer@xyx.com Ready
S: AUTHENTICATE ANONYMOUS
R: +
S: c21yaGM
R: 2.2 Welcome anonymous
```

An iRIP capable server permitting anonymous access will permit operations, usually restricted to limited and non-destructive commands.

To properly implement the ANONYMOUS authentication, refer to [ANON-SASL].

3.3 CAPABILITY

The CAPABILITY command tells the server to return a list of capabilities it supports. The server must return a CAPABILITY response with "IRIPrev1" as one of the listed capabilities. The CAPBILITY command can be issued in any connection state and the reply is not dependent upon the connection state.

A capability name which begins with "AUTH=" indicates that the server supports that particular authentication mechanism.

Example:

```
S: CAPABILITY
R: CAPABILITY IRIPrev1 AUTH=KERBEROS_V4
R: 2.0 OK
```

3.4 CONTINUE

The CONTINUE command is issued by the Sender to allow an ICALDATA request to continue being processed. When the latency time is specified on the ICALDATA command, the Receiver must issue a reply to the Sender within the specified time. The reply may be a reply code indicating that the server has not yet processed the request. The Sender must then tell the server whether to continue or abort.

Example:

```
...
S: ICALDATA:10
R: 354 Start ICAL input; end with <CRLF>.<CRLF>
S: BEGIN:VCALENDAR
   ...
S: END:VCALENDAR
S: .
<after 10 seconds...>
R: .
R: 3.5.0  Reply Pending
S: CONTINUE
R: BEGIN:VCALENDAR
...
R: END:VCALENDAR
R: .
```

R: 2.0 OK

3.5 DISCONNECT

The DISCONNECT command signals the end of communication between the Sender and Receiver.

Example:

S: DISCONNECT
R: 2.1 EXAMPLE.COM IRIP Service closing transmission channel

3.6 ICALDATA

The ICALDATA is used specify the iCalendar Object that is to be delivered to one or more recipients specified in the RECIPIENT command. The format of the command is:

S: ICALDATA[:latencyTime]
S: <MIME encapsulated iCalendar Object>
S: <CRLF>.<CRLF>
R: <MIME encapsulated iCalendar Object >
R: <CRLF>.<CRLF>
R: <reply code>

An optional argument to ICALDATA specifies the maximum amount of time the Sender can wait for a reply. This is followed by iCalendar Object data. The data is terminated by the special sequence <CRLF>.<CRLF>. The server reply may optionally contain an iCalendar Object, the special sequence <CRLF>.<CRLF> followed by a reply code.

S: ICALDATA
R: 3.5.4 Start ICAL input; end with <CRLF>.<CRLF>
S: Content-Type:text/calendar; method=REQUEST; charset=US-ASCII
S: Content-Transfer-Encoding: 7bit
S:
S: BEGIN:VCALENDAR
S: etc., etc.
S: END:VCALENDAR
S: .
R: .

R: 2.0 OK

3.7 RECIPIENT

The RECIPIENT command is used to identify a recipient of the iCalendar Object. Use multiple RECIPIENT commands to specify multiple recipients. The command format is

RECIPIENT rfc822address <or something ...>

3.8 SWITCH

The SWITCH command is used to allow the Sender and Receiver to change roles. Its format is:

SWITCH

The SWITCH command is useful in environments where the firewall of a Sender would not allow the Receiver to initiate a connection. The SWITCH command is issued by the Sender to give the Receiver the opportunity to take the role of the Sender.

The Receiver must respond in one of the following fashions:

. send an OK reply and take on the role of Sender
. send a error reply indicating refusal and retain the role of Receiver

If program-A is currently the Sender and sends the SWITCH command and receives an OK reply then program-A becomes the Receiver. Program-A is then in its initial state and sends a service ready greeting message.

If program-B is currently the Receiver and sends an OK reply in response to a SWITCH command then program-B becomes the Sender. Program-B is then in the initial state as if the transmission channel just opened, and expects to receive a service ready greeting.

3.9 Error Codes

iRIP error codes follow the format defined for Status Replies in [ITIP]. All Status Replies as defined in [ITIP] are valid error codes when

returned by an iRIP command.

In addition to those defined in [ITIP], iRIP defines the following error codes:

6.0	**AUTHORIZATION FAILED**	General authorization failure
6.1	**TRANSITION-NEEDED**	Indicates the transition from a legacy database to a more secure password mechanism, and reports that the new mechanism is not usable until "AUTHENTICATE PLAIN" or a login procedure is used.
6.2	**AUTH-TOO-WEAK**	Indicates that multiple remote services are offered, and therefore there is no practical way to transition every remote service. So, the mechanism must not allow users to have different passwords for different services. The error code reports that no new plaintext passwords will be accepted from the user at a later date. It could also indicate that the requested mechanism is not available.
6.3	**ENCRYPT-NEEDED**	Indicates that the requested mechanism it to be used in conjunction with a strong external encryption layer.
7.0	**TIMEOUT**	The requested operation could not be completed in the time allotted.
8.0	**GENERAL FAILURE**	A failure has occurred in the Receiver that prevents the operation from succeeding.
8.1	**SERVER TOO BUSY**	Sent when a connection cannot be established because the iRIP Receiver is too busy.

9.0	**INVALID IRIP COMMAND**	An unrecongnized command was received.
10.0	**NOT HERE**	The Receiver does not know how to

		contact the Calendar Store for the specified RECIPIENT.
10.1	**REFERRAL**	Accompanied by an alternate address. The RECIPIENT specified should be contacted at the given alternate address.

4. Security Considerations

The security of iRIP with SASL support is highly dependent on the mechanism used to authenticate the client and whether or not the security layer is further negotiated. Without a robust security layer, iRIP transactions are subject to eavesdropping and the integrity of iRIP transactions may be compromised. Since iRIP is designed specifically for real time Internet transactions, it is recommended that implementations use the highest degree of authentication and transmission security possible.

Authentication is fundamental to iRIP. It is the basis for granting and denying access. Without a robust security layer iRIP will be subject to many possible attacks and the full contents of the server itself may be at risk.

4.1 SASL ANONYMOUS Mechanism

Implementing support for the Anonymous SASL significantly increases the vulnerability of the calendar server and its data. Refer to [ANON-SASL] for further information on many threats specific to Anonymous SASL access.

4.2 SASL Profile Definition

(Need to complete with full details)

The implementation of SASL in iRIP requires the server and client to comply to the following profile extension:

AUTHENTICATE command.

Full description of the challenge/response definition.

Starting octet.

Interpretation of the authorization identity passed should be interpreted.

4.3 ITIP Threats

Threat: Spoofing the organizer or attendee.

Solution: The entire protection for spoofing attendees or organizer of a meeting resides in the fact that the connection needs to be authenticated. Spoofing would be possible in the absence of authentication.

Threat: Eavesdropping on the traffic.

Solution: If SASL is used to negotiate with the server a security layer, then traffic is no longer in the clear and eavesdropping will not be restricted.

Threat: Flooding of a calendar

Solution: Implementation of iRIP should limit the size and traffic of transaction from a given source.

Threat: Procedural Alarms

Solution: Implementation of iRIP should remove or disallow procedural alarms before delivery.

4.4 IRIP-Specific Threats

Threat: Flooding of connections

Solution: Connections that have not been authenticated within 3 seconds should be disconnected. Peter/Steve, this looks very arbitrary. Is there a better way of doing this ?

5. Examples

5.1 Unathenticated Freebusy Request

This examples shows an anonymous request for the freebusy time of sman@example.com

R: <listen on TCP port 5228>
S: <establish a connection to TCP port 5228>

```
R: 2.2 BIG-Time iRIPServer@example.com Ready
S: AUTHENTICATE LOGIN anonymous xyz.unknown.com
R: 2.2 Welcome anonymous
S: RECIPIENT:sman
R: 2.0 OK
S: ICALDATA
R: 3.5.4 Start ICAL input; end with <CRLF>.<CRLF>
S: Content-Type:text/calendar; method=REQUEST; charset=US-ASCII
S: Content-Transfer-Encoding: 7bit
```



```
S:
S: BEGIN:VCALENDAR
S: PRODID:-//ACME/DesktopCalendar//EN
S: METHOD:REQUEST
S: VERSION:2.0
S: BEGIN:VFREEBUSY
S: ATTENDEE;ROLE=OWNER:A@acme.com
S: ATTENDEE:sman@acme.com
S: DTSTAMP:19971113T190000-0800
S: DTSTART:19971115T080000-0800
S: DTEND:19971115T200000-0800
S: UID:www.acme.com-873970198738777@host.com
S: END:VFREEBUSY
S: END:VCALENDAR
S: .
R: Content-Type:text/calendar; method=REQUEST; charset=US-ASCII
R: Content-Transfer-Encoding: 7bit
R:
R: BEGIN:VCALENDAR
R: PRODID:-//ACME/DesktopCalendar//EN
R: METHOD:REPLY
R: VERSION:2.0
R: BEGIN:VFREEBUSY
R: ATTENDEE:sman@example.com
R: DTSTAMP:19971113T190005-0800
R: DTSTART:19971115T080000-0800
R: DTEND:19971115T200000-0800
R: UID:www.acme.com-873970198738777@host.com
R: FREEBUSY:19970701T090000-0700/PT1H,19970701T140000-0700/PT30H
R: END:VFREEBUSY
R: END:VCALENDAR
R: .
R: 2.5 OK
```

S: DISCONNECT
R: OK
R: <disconnect>
S: <disconnect>

6. Acknowledgments

The following have participated in the drafting and discussion of this memo:

Mugino Saeki

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8. Open Issues.

Anonymous access _ Mugino,

Proxy Access via SASL _ Mugino, how does the proxy capability of SASL maches iRIP's requirement for PROXY capability ?

Registration of the SASL profile for iRIP with the IANA.

9. Author's Address

The following address information is provided in a vCard v2.1, Electronic Business Card, format.

BEGIN:VCARD
FN:Andre Courtemanche
ORG:CS&T
ADR;WORK;POSTAL;PARCEL:;;3333 Graham Boulevard;Montreal;QC;H3R 3L5;Canada

```
TEL;WORK;MSG:+1-514-733-8500
TEL;WORK;FAX:+1-514-733-8788
EMAIL;INTERNET:andre@cst.ca
END:VCARD

BEGIN:VCARD
FN:Steve Mansour
ORG:Netscape Communications Corporation
ADR;WORK;POSTAL;PARCEL:;;501 East Middlefield Road;Mountain
View;CA;94043;USA
TEL;WORK;MSG:+1-415-937-2378
TEL;WORK;FAX:+1-415-428-4059
EMAIL;INTERNET:sman@netscape.com
END:VCARD


BEGIN:VCARD
FN:Peter O'Leary
ORG:Amplitude Software Corp.
ADR;WORK;POSTAL;PARCEL:;;185 Berry St. Suite 4700; San Francisco;CA;
94107;USA
TEL;WORK;MSG:+1-415-659-3511
TEL;WORK;FAX:+1-415-659-0006
EMAIL;INTERNET:poleary@amplitude.com
END:VCARD
```

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