

**Uniform Resource Locator Schemes for  
Internet Relay Chat Entities  
<[draft-butcher-irc-url-04.txt](#)>**

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Abstract

This document specifies two URL (Uniform Resource Locator) schemes, using the URI (Uniform Resource Indicator) names "irc" and "ircs", for the location of IRC (Internet Relay Chat) servers. These URLs allow for easy location of an IRC server, optionally also specifying an IRC channel to join, or a person's nickname to contact upon connection.

## 1. Introduction

Since its introduction, Internet Relay Chat (IRC) has become widely known and used within the Internet Community as a real-time chat medium. IRC networks are steadily growing larger, not only with regards to the number of regular users, but also the number of channels and servers required to support the diverse demand.

Due to the nature of IRC as a real-time chat service, it has been known to be used for a wide variety of uses such as software support, job interviews, and of course just for a casual conversation.

For years now, the need for an appropriate Uniform Resource Locator (URL) scheme has been apparent. Applications for such a scheme range quite widely, including IRC network's server lists on their website, technical support contact details, or even a meeting location within an e-mail, giving a specific IRC channel or nickname to contact.

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 [[RFC2119](#)].

In this document, the term "client" is defined as the IRC client software, and the term "user" is the end-user of that software. The term "entity" refers to an addressable IRC entity, such as a user, service, or channel.

## 2. URL Definition

An IRC URL begins with either the Uniform Resource Identifiers (URIs) "irc", or "ircs", denoting normal and secured connections respectively. Normal sessions are via existing transport (such as that in [[RFC2812](#)]) and is to be considered insecure. Secured sessions are much the same, only secured via a "blanket security" method such as [[SSL](#)], or negotiating a [[TLS](#)] session.

The URL scheme for IRC follows the Generic URL Syntax ([[RFC2396](#)]).

The action the URL instigates is to open a connection to the specified IRC server using whatever protocol necessary, and make contact with the given user, service or channel, if also requested.

There is no requirement for IRC client software implementing the "irc" scheme to also implement the "ircs" scheme, or vice-versa. It is, however, RECOMMENDED that clients implementing the "ircs" scheme are also capable of handling a normal connection via the "irc" scheme.

## 2.1. ABNF Syntax

Below is the definition for the IRC URL scheme in [\[ABNF\]](#) grammar:

```
ircURL = ircURI "://" location "/" [ entity ] [ flags ] [ options ]
```

```
ircURI = "irc" / "ircs"
        ; See Section 2, above, for details.
```

```
location = [ authinfo "@" ] hostport
           ; See Section 3.2.2 of \[RFC2396\] for the definition
           ; of 'hostport'.
```

```
authinfo = [ username ] [ ":" password ]
           ; See Section 2.2 of this document for details.
```

```
username = *( escaped / unreserved )
```

```
password = *( escaped / unreserved ) [ ";" passtype ]
```

```
passtype = *( escaped / unreserved )
```

```
entity = [ "#" ] *( escaped / unreserved )
         ; Note the prefix, "#", may be used for channel names
         ; without escapes. Please see Section 2.5.1.
```

```
flags = ( [ "," enttype ] [ "," hosttype ] )
        /= ( [ "," hosttype ] [ "," enttype ] )
```

```
enttype = "," ( "isuser" / "ischannel" )
```

```
hosttype = "," ( "isserver" / "isnetwork" )
```

```
options = "?" option *( "&" option )
```

```
option = optname [ "=" optvalue ]
```

```
optname = *( ALPHA / "-" )
         ; Option names are case-insensitive.
```

```
optvalue = optparam *( "," optparam )
```

```
optparam = *( escaped / unreserved )
```

The definition of "escaped" and "unreserved" is in sections 2.4.1 and 2.3 of [\[RFC2396\]](#) respectively. Clients MUST be aware of protocol limitations. For example, using "IRC-2" ([RFC2812](#)), it's impossible to use codepoint U+0020 in names.

## **2.2. Authentication**

To allow for complete authentication of a session, a username MAY be provided with the password. The username MUST NOT be passed to the server as a nickname. For example, while registering a connection using the "IRC-2" protocol, the username would be passed as the first parameter of the "USER" command (See [Section 3.1.3 of \[RFC2812\]](#)).

The characters available for use in a username may be restricted by the protocol used, and the IRC server software used.

The use of the password field is not recommended, as it presents a significant security problem. Authors of IRC URLs using the authentication field, including a password, should make themselves aware of the security issues discussed in [Section 6](#) of this document.

See [Section 3](#) for examples of username/password pair authentication, and traditional server password only authentication.

## **2.3. Server Names**

Servers can be named with either their hostname, or address, like other URL schemes, but also with an IRC Network's name. The difference can be explicitly specified using the "isserver" and "isnetwork" keywords in the "hosttype" section (see [Section 3](#) for examples).

As many modern IRC clients maintain lists of major IRC networks and their respective servers, determination of a server to connect to from a given network name should be a trivial task.

If the host name used is not a raw address (such as an IPv4, IPv6, or other network address), the name cannot be resolved (through DNS or other means), and does not contain a period character (U+002E), the client MAY consider the given host name as a network name to find an appropriate IRC server.

If the IRC client does not contain IRC Network name lists, and "isnetwork" has been specified, the client MUST NOT attempt to resolve the network name as a hostname.

## **2.4. Server Ports**

Special consideration must be given to URLs without ports specified. Almost all IRC servers are contactable on a variety of standard ports as allocated by the IANA. Should an IRC URL be specified without a

port, a client MAY try a number of standard ports:

- For the "irc" URI, the client SHOULD attempt connection to the port 6667, and MAY attempt connection to the ports 194, 6665, 6666, 6668 and 6669, in that order. Port 194 is likely to be a more "authentic" server, however at this time the majority of IRC servers are available on port 6667, at least.
- For the "ircs" URI, the default port used is 994. User-space ports (those above port 1023) may have questionable authenticity, and SHOULD NOT be used unless explicitly specified.

Port numbers shown are in decimal, and have been assigned by the IANA. [Section 3.2.2 of \[RFC2396\]](#) suggests only one port may be used as a default port, and does not state a preference for or against port hunting. The act of port hunting for the "irc" scheme when no port is specified is therefore left up to the discretion of client authors.

For URL equivalency, clients SHOULD consider default ports without considering port-hunting. For example, `<irc://some.server/>` and `<irc://some.server:6667/>` should be considered equivalent, as should `<ircs://some.server/>` and `<ircs://some.server:994/>`.

Note that the port 194 is officially the "standard" port for IRC servers, the current practise is to use port 6667. This document may be updated in the future if and when port 194 obtains an increased prevailance.

## **2.5. Entity Names**

Only one entity can be named per URL. The named entity SHOULD be presumed to be a channel name, unless the "enttype" section (see [Section 2.1](#)) of the URL is provided to determine the entity type.

An automated message MUST NOT be sent to the addressed entity.

### **2.5.1. Channel Names**

When "enttype" contains "ischannel", or "enttype" is omitted completely, the entity name provided is a channel name.

While it is discouraged, channel names prefixed with the "#" (U+0023) character may be specified without encoding the character (as "%23") in the URL. Implementers MAY accept this, despite it being an

exception to [Section 2.4.3 of \[RFC2396\]](#), because channels of this type are currently very common, and will remain so in the foreseeable future.

Clients SHOULD attempt to determine valid channel name prefix characters from the server it has connected to, such as via an "RPL\_ISUPPORT" reply. If the client is unable to determine valid prefix characters for the server it is connected to, the client SHOULD attempt to join the channel without modifying its name. If joining the channel failed, the prefix character "#" may be used.

If the client discovers the channel name given is considered to be invalid because it is missing a valid prefix character, the client SHOULD prepend a default prefix character to the name.

Since default prefix characters for channels may differ between IRC servers, the client SHOULD try to determine the default channel prefix for the server it is connected to, such as the first prefix character given by "CHANTYPES" in "RPL\_ISUPPORT". If the client is still unable to determine a prefix character, a prefix character of '#' (U+0023) MAY be presumed.

### **2.5.2. Nicknames**

When "enttype" contains "isuser", the entity given refers to a user. The given entity name may simply be a nickname, or it may contain more specific information such as the user's hostname, username, or a server they use.

A user entity is referred to using the following syntax (in [\[ABNF\]](#) grammar):

```
userent = nickname [ "%21" username ] [ "%40" hostname ]
```

The definitions of "nickname", "username", and "hostname" are all identical to the definition of "entname", as defined in [Section 2.1](#) of this document.

It's RECOMMENDED that the client parse this name, as most servers will not accept this syntax directly. For example, the client may wish to make use of the IRC-2 "WHO" command to discover if the entity is valid and available.

## **2.6. Additional Options**

Additional options may be used to provide additional information about the entity you're addressing.

These options listed here may be expanded on at a later date by future documents. Unsupported options **MUST** be ignored by the client. The client author is not obligated to utilise the "options" section (see [Section 2.1](#)) of the URL, but it is **RECOMMENDED** to do so.

### **2.6.1. The "key" Option**

This option is only valid if the entity name given is a channel name. If the entity name is not a channel name, then this option **MUST** simply be ignored.

The option's value provides a "key" to be given to the server when joining the given channel name, and is used for channels which require a "key" to join them. If a channel key is found to be required and one is not provided with this option, the IRC client may wish to prompt the user for the key.

Please see [Section 6](#) of this document.

## **3. Examples**

While examples of every situation cannot be shown here because of space considerations, the following examples provide a rough overview of how the IRC URL can be used.

```
<irc://irc.undernet.org/>
```

In its simplest form, the above complete URL can be used to direct a client to a specific IRC server, which in this case is "irc.undernet.org". The client should presume to use default port settings.

```
<irc://irc.ircnet.net/#worldchat,ischannel>  
<irc://irc.ircnet.net/%23worldchat,ischannel>  
<irc://irc.ircnet.net/#worldchat>  
<irc://irc.ircnet.net:6667/%23worldchat>
```

All four of these URLs connects to the IRCnet network, and will join the client to the channel "#worldchat" upon connection. All of these URLs are considered identical.

```
<irc://irc.alien.net.au/pickle,isuser>
```

This will connect to the server "irc.alien.net.au" and will provoke the client to open up a window (or similar) associated with sending messages to the nickname 'pickle'.

```
<irc://irc.austnet.org/%23foobar?key=bazqux>
```

This will connect to AUSTnet and join the channel "#foobar", using the channel key "bazqux".

```
<irc://undernet/pickle%25butcher.id.au,isuser>
```

This will open a dialogue box prepared to send a message to "pickle" with the server name "butcher.id.au". This URL will connect to the network named as "undernet". For this to work correctly, the client must be configured appropriately to know of at least one server's address associated with this name.

```
<irc://:pass@irc.efnet.org:194/>
```

The above URL specifies that the IRC client should try to connect to "irc.efnet.org" on the port 194, rather than use the default port(s). It also tells the IRC client it should try to connect to the server using the server password "pass".

```
<irc://%C4%B0dil:g%C3%BCzel@irc.austnet.org/>
```

This shows a properly [UTF-8] encoded URL, specifying the username "Idil" (with the first character being a Turkish Latin capital letter "I" with a dot above it, [Unicode] codepoint U+0130) and the password "guzel" (with a diaeresis on the u, codepoint U+00FC).



#### **4. Internationalisation Considerations**

With the inevitable adoption of [[Unicode](#)] on IRC, and indeed the Internet as a whole, URLs MUST be encoded using the [[UTF-8](#)] character set, with (potentially) unsafe octets encoded using %HH notation (where HH is a hexadecimal value), as per [Section 2.2.5 of \[RFC-2718\]](#). An example of this in action can be found in [Section 3](#).

Some IRC servers use such character sets as US-ASCII and KOI-8. It is left up to the client and the server to negotiate an appropriate character set for communication between the two, as more servers are now implementing specific character-set preferences. It is also left up to the client to convert entity names from UTF-8 into the appropriate character set.

At the time of writing, [[UTF-8](#)] is set to become the popular choice (announced via RPL\_ISUPPORT) as it's easy to implement with very minimal changes to existing server software. Other IRC servers are opting to announce a preferred character set, but allow the client to switch character sets on the fly, using CAP/CAPAB negotiation, oft implemented using the UNIX98 iconv() function (or something similar).

## **5. Interoperability Considerations**

Many existing implementations fail to acknowledge the correct use of the generic URL syntax defined in [[RFC2396](#)], but act like they use the format.

Some current implementations will need slight modification to accept the extended format defined in this specification, however most implementations which parse the URL in a standard form will continue to work for most IRC URLs.

The presumption of a channel name without explicitly specifying the entity type is designed to maintain compatibility with the existing implementations. The practise of omitting the channel prefix character, or not encoding it, is also for compatibility, but is **STRONGLY DISCOURAGED**.

There are interoperability issues with existing IRC servers as a result of the restricted characters available for channel names and nicknames. The restriction of acceptable characters has been left up to the IRC server authors and not the URL scheme, as not to hinder advances in IRC protocols and servers.

Some existing IRC servers will accept nickname/password pairs, however at the time of writing these servers do not use this for actually authenticating the session, but instead identifying nicknames to nickname registration services. The use of username/password pairs is used for actual authentication, and has been included.

## 6. Security Considerations

Security problems naturally arise when a server password and/or a channel key is specified (using the "key" option). While the use of the password and channel key sections is considered to be rare, and they have been included for uses such as for shortcut/bookmark lists, or to be used as a user command.

As the passwords and channel keys are unfortunately passed as clear text, any user using the IRC URL should be aware of obvious insecurities. It is strongly discouraged to use these fields in a public sense, such as on a website.

Furthermore, it is recommended that client software does not automatically initiate the connection specified by the URL without the knowledge and consent of the user. To do so would open the implementation up to a variety of malicious activities including, but not limited to, the purposes of direct advertising or channel advertising (known as "spam") via "pop-ups" or other means.

When connecting using a secure connection ("ircs://"), user-space ports (those above port 1023) should be treated with suspicion, as their authority could be questionable. If a secure connection cannot be established, the client MUST NOT automatically default to an insecure ("irc://") connection. To do so would denigrate the "ircs" scheme and restrict its usefulness.

Automated messages MUST NOT be sent to any entity upon connection to an IRC server as a direct result of execution of an IRC URL. Sending messages to channels and other users should be left up to the user, not the URL author or the client software. The facility to send automated messages to other users has been explicitly avoided in this document to avoid abuse, common with IRC.

Clients MUST be aware of protocol limitations, especially when dealing with entity names, as the probability for exploitation is high. For example, a URL with a nickname including "%0D%0A" could be used to exploit a client using the "IRC-2" protocol, potentially allowing a malicious URL author to execute any command they wish.

Beyond this, there are security concerns with regards with associated protocols, including the IRC server-to-user protocols themselves, [\[TLS\]](#) and [\[UTF-8\]](#), which must be taken into consideration, but are beyond the scope of this document.

## **7. IANA Considerations**

The following is registration for the URL schemes as per [[RFC2717](#)]:

URL scheme name: Two URI's are described herein: "irc" and "ircs".

URL scheme syntax: See [Section 2.1](#), and indeed [Section 2](#) as a whole.

Character encoding considerations: Characters must be encoded in UTF-8 and escaped. See [Section 4](#).

Intended usage: The scheme initiates connection to an IRC server, normally through the execution of IRC Client software. Furthermore, the scheme may then initiate further commands, such as joining channels, as outlined above.

Interoperability considerations: See [Section 5](#).

Security considerations: See [Section 6](#).

Relevant publications: The IRC protocol is defined by [[RFC2812](#)]. Either [[SSL](#)] or [[TLS](#)] may be used for the "ircs" scheme, depending on client and server configuration.

Person & email address to contact for further information: The Author; See [Section 10](#) for details.

Author/Change controller: The Author's details are contained within [Section 10](#). The IETF is to maintain change control.

## **8. Acknowledgments**

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