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Traversal Using Relays around NAT (TURN) Uniform Resource Identifiers
draft-petithuguenin-behave-turn-uris-02

Abstract

   This document specifies the syntax of Uniform Resource Identifier
   (URI) schemes for the Traversal Using Relays around NAT (TURN)
   protocol. It defines two URI schemes that can be used to provision
   the configuration values needed by the resolution mechanism defined
   in [RFC5928] .

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1. Introduction

   This document specifies the syntax and semantics of the Uniform
   Resource Identifier (URI) scheme for the Traversal Using Relays
   around NAT (TURN) protocol.

   The TURN protocol is a specification allowing hosts behind NAT to
   control the operation of a relay server. The relay server allows
   hosts to exchange packets with its peers. The peers themselves may
   also be behind NATs. RFC 5766 [RFC5766] defines the specifics of the
   TURN protocol.

   The "turn/turns" URI scheme is used to designate a TURN server (also
   known as a relay) on Internet hosts accessible using the TURN
   protocol. With the advent of standards such as [WEBRTC] , we
   anticipate a plethora of endpoints and web applications to be able to
   identify and communicate with such a TURN server to carry out the
   TURN protocol. This also implies those endpoints and/or applications
   to be provisioned with appropriate configuration required to identify
   the TURN server. Having an inconsistent syntax has its drawbacks and
   can result in non-interoperable solutions. It can result in
   solutions that are ambiguous and have implementation limitations on
   the different aspects of the syntax and alike. The "turn/turns" URI
   scheme helps alleviate most of these issues by providing a consistent
   way to describe, configure and exchange the information identifying a
   TURN server. This would also prevent the shortcomings inherent with
   encoding similar information in non-uniform syntaxes such as the ones
   proposed in [WEBRTC] , for example.

   [RFC5928] defines a resolution mechanism to convert a secure flag, a
   host name or IP address, an eventually empty port, and an eventually
   empty transport to a list of IP address, port, and TURN transport
   tuples.

   To simplify the provisioning of TURN clients, this document defines a
   TURN and a TURNS URI scheme that can carry the four components needed
   for the resolution mechanism.

   A reference implementation [REF-IMPL] is available.

2. Terminology

   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] .

   "SHOULD", "SHOULD NOT", "RECOMMENDED", and "NOT RECOMMENDED" are

appropriate when valid exceptions to a general requirement are known
to exist or appear to exist, and it is infeasible or impractical to
enumerate all of them. However, they should not be interpreted as
permitting implementors to fail to implement the general requirement
when such failure would result in interoperability failure.

3. Syntax of a TURN or TURNS URI

3.1. URI Scheme Syntax

The "turn" URI takes the following form (the syntax below is non-
normative):

       turn:<host>:<port>
       turns:<host>:<port>

Note that the <port> part and the preceding ":" (colon) character, is
OPTIONAL.

A TURN/TURNS URI has the following formal ABNF syntax [RFC5234] :
```
turnURI        = scheme ":" turn-host [ ":" turn-port ]
                  [ "?transport=" transport ]
scheme         = "turn" / "turns"
transport      = "udp" / "tcp" / transport-ext
transport-ext  = 1*unreserved
turn-host      = IP-literal / IPv4address / reg-name
turn-port      = *DIGIT
IP-literal     = "[" ( IPv6address / IPvFuture  ) "]"
IPvFuture      = "v" 1*HEXDIG "." 1*( unreserved / sub-delims / ":" )
IPv6address    =                            6( h16 ":" ) ls32
                 /                     "::" 5( h16 ":" ) ls32
                 / [               h16 ] "::" 4( h16 ":" ) ls32
                 / [ *1( h16 ":" ) h16 ] "::" 3( h16 ":" ) ls32
                 / [ *2( h16 ":" ) h16 ] "::" 2( h16 ":" ) ls32
                 / [ *3( h16 ":" ) h16 ] "::"    h16 ":"   ls32
                 / [ *4( h16 ":" ) h16 ] "::"              ls32
                 / [ *5( h16 ":" ) h16 ] "::"              h16
                 / [ *6( h16 ":" ) h16 ] "::"
h16            = 1*4HEXDIG
ls32           = ( h16 ":" h16 ) / IPv4address
IPv4address    = dec-octet "." dec-octet "." dec-octet "." dec-octet
dec-octet      = DIGIT                 ; 0-9
                 / %x31-39 DIGIT       ; 10-99
                 / "1" 2DIGIT          ; 100-199
                 / "2" %x30-34 DIGIT   ; 200-249
                 / "25" %x30-35        ; 250-255
reg-name       = *( unreserved / pct-encoded / sub-delims )
```

<unreserved>, <sub-delims>, and <pct-encoded> are specified in
[RFC3986] . The core rules <DIGIT> and <HEXDIGIT> are used as
described in Appendix B of RFC 5234 [RFC5234] .

The <host>, <port> and <transport> components are passed without
modification to the [RFC5928] algorithm. <secure> is set to false if
<scheme> is equal to "turn" and set to true if <scheme> is equal to
"turns" and passed to the [RFC5928] algorithm with the other
components.

3.2. URI Scheme Semantics

The TURN protocol supports sending messages over UDP, TCP or TLS-
over-TCP. The "turns" URI scheme SHALL be used when TURN is run over
TLS-over-TCP (or in the future DTLS-over-UDP) and the "turn" scheme
SHALL be used otherwise.

The required <host> part of the "turn" URI denotes the TURN server
host.

The <port> part, if present, denotes the port on which the TURN
server is awaiting connection requests. If it is absent, the default
port SHALL be 3478 for both UDP and TCP. The default port for TURN
over TLS SHALL be 5349.

4. Security Considerations

Security considerations for the resolution mechanism are discussed in
[RFC5928] .

The "turn" and "turns" URI schemes do not introduce any specific
security issues beyond the security considerations discussed in
[RFC3986] .

5. IANA Considerations

This section contains the registration information for the "turn" and
"turns" URI Schemes (in accordance with [RFC4395]).

5.1. TURN URI Registration

URI scheme name: turn

Status: permanent

URI scheme syntax: See Section 3 .

URI scheme semantics: See [RFC5928] .

Encoding considerations: There are no encoding considerations beyond those in [RFC3986] .

Applications/protocols that use this URI scheme name:

   The "turn" URI scheme is intended to be used by applications that might need access to a TURN server.

Interoperability considerations: N/A

Security considerations: See Section 4 .

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Author/Change controller: The IESG

References: RFCXXXX

[[NOTE TO RFC EDITOR: Please change XXXX to the number assigned to this specification, and remove this paragraph on publication.]]

5.2. TURNS URI Registration

URI scheme name: turns

Status: permanent

URI scheme syntax: See Section 3 .

URI scheme semantics: See [RFC5928] .

Encoding considerations: There are no encoding considerations beyond those in [RFC3986] .

Applications/protocols that use this URI scheme name:

   The "turns" URI scheme is intended to be used by applications that might need access to a TURN server over a secure connection.

Interoperability considerations: N/A

Security considerations: See Section 4 .

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References: RFCXXXX

[[NOTE TO RFC EDITOR: Please change XXXX to the number assigned to
this specification, and remove this paragraph on publication.]]

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draft-petithuguenin-behave-turn-uri-bis document.

Many thanks to Cullen Jennings for his detailed review and thoughtful
comments on the draft-nandakumar-rtcweb-turn-uri document.

The <turn-port> and <turn-host> ABNF productions have been copied
from the <port> and <host> ABNF productions from [RFC3986] .

7. References

7.1. Normative References

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

[RFC3986]   Berners-Lee, T., Fielding, R., and L. Masinter, "Uniform
            Resource Identifier (URI): Generic Syntax", STD 66,
            RFC 3986, January 2005.

[RFC5234]   Crocker, D. and P. Overell, "Augmented BNF for Syntax
            Specifications: ABNF", STD 68, RFC 5234, January 2008.

[RFC5766]   Mahy, R., Matthews, P., and J. Rosenberg, "Traversal Using
            Relays around NAT (TURN): Relay Extensions to Session
            Traversal Utilities for NAT (STUN)", RFC 5766, April 2010.

[RFC5928]   Petit-Huguenin, M., "Traversal Using Relays around NAT
            (TURN) Resolution Mechanism", RFC 5928, August 2010.

7.2. Informative References

[RFC4395]   Hansen, T., Hardie, T., and L. Masinter, "Guidelines and
            Registration Procedures for New URI Schemes", BCP 35,
            RFC 4395, February 2006.

   [WEBRTC]   Bergkvist, A., Burnett, D., Jennings, C., and A.
               Narayanan, "WebRTC 1.0: Real-time Communication Between
               Browsers", World Wide Web Consortium WD WD-webrtc-
               20120821, August 2012,
               <http://www.w3.org/TR/2012/WD-webrtc-20120821>.

   [REF-IMPL]
               Petit-Huguenin, MPH., "Reference Implementation of TURN
               resolver and TURN URI parser".

               <http://debian.implementers.org/stable/source/
               turnuri.tar.gz> .

Appendix A. Examples

   Table 1 shows how the <secure>, <port> and <transport> components are
   populated from various URIs. For all these examples, the <host>
   component is populated with "example.org".

```
   +-------------------------------+----------+--------+-------------+
   | URI                           | <secure> | <port> | <transport> |
   +-------------------------------+----------+--------+-------------+
   | turn:example.org              | false    |        |             |
   | turns:example.org             | true     |        |             |
   | turn:example.org:8000         | false    | 8000   |             |
   | turn:example.org?transport=udp| false    |        | UDP         |
   | turn:example.org?transport=tcp| false    |        | TCP         |
   | turns:example.org?transport=tcp| true    |        | TLS         |
   +-------------------------------+----------+--------+-------------+
```

                              Table 1

Appendix B. Release notes

   This section must be removed before publication as an RFC.

B.1. Design Notes

   o One recurring comment was to stop using the suffix "s" on URI
      scheme, and to move the secure option to a parameter (e.g.
      ";proto=tls"). We decided against this idea because the STUN URI
      does not have a ";proto=" parameter and we would have lost the
      symmetry between the TURN and STUN URIs. A more detailed account
      of the reasoning behind this is available at <http://
      blog.marc.petit-huguenin.org/2012/09/
      on-design-of-stun-and-turn-uri-formats.html>

o Following the advice of RFC 4395 section 2.2., and because the
   TURN URI does not describe a hierarchical structure, the TURN URIs
   are opaque URIs.
o <password> is not used in the URIs because it is deprecated.
   <username> is not used in the URIs because it is not used to guide
   the resolution mechanism.
o As discussed in Dublin, there is no generic parameters in the URI
   to prevent compatibity issues.

B.2. **Modifications between petithuguenin-behave-turn-uris-02 and**
      petithuguenin-behave-turn-uris-01

o Added design note about choice for turn/turns syntax.

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