IP Proxying Support for HTTP

draft-age-masque-connect-ip

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CONNECT-IP... haven’t I seen many proposals for this before?
The various proposals joined forces to have a single document!
Motivation

Allow generic IP proxying through HTTP proxies, not just connections to a single TCP/UDP target

VPN use cases (meeting the requirements in ip-proxy-reqs)

CONNECT-like proxy for arbitrary IP protocols (mirror CONNECT-UDP)
Scope

Extended CONNECT protocol, mirroring CONNECT-UDP

Proxies entire IP packets in HTTP Datagrams (no compression in base draft)

Request, assign, and route based on fields in the IP header only

  Source address, destination address, next protocol
Out of scope

IP header compression

ICMP signalling (should be another document common for UDP and IP)

Integration with protocol-specific port numbers
What’s defined?

“connect-ip” upgrade/protocol token
target and ipproto URI variables
ADDRESS_ASSIGN, ADDRESS_REQUEST,
ROUTE_ADVERTISEMENT capsules
IP_PACKET HTTP datagram format
Limiting routing

Not everything is a full tunnel!

Clients can limit the scope of requests via target and ipproto URI variable

Endpoints limit the source address used by peers with ADDRESS.Assign

Endpoints limit the destination address used by peers with ROUTE.Advertisement

Limited scope allows a proxy to share IP addresses between multiple clients, like CONNECT and CONNECT-UDP
VPN

STREAM(44): HEADERS
:method = CONNECT
:protocol = connect-ip
:scheme = https
:path = /vpn
:authority = server.example.com

STREAM(44): CAPSULE
Capsule Type = REGISTER_DATAGRAM_CONTEXT
Context ID = 0
Context Extension = {}
VPN

STREAM(44): HEADERS
:status = 200

STREAM(44): CAPSULE
Capsule Type = ADDRESS_ASSIGN
IP Version = 4
IP Address = 192.0.2.11 // IP C
IP Prefix Length = 32

STREAM(44): CAPSULE
Capsule Type = ROUTE_ADVERTISEMENT
(IP Version = 4
Start IP Address = 0.0.0.0
End IP Address = 255.255.255.255
IP Protocol = 0) // Any
VPN

+--------+ IP A         IP B +--------+              +---> IP D
|        |-------------------|        | IP C         |
| Client | IP Subnet C <-> * | Server |--------------+---> IP E
|        |-------------------|        |              |
+--------+                   +--------+              +---> IP ...

**DATAGRAM**
Quarter Stream ID = 11
Context ID = 0
Payload = Encapsulated IP Packet

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IP Flow Forwarding

STREAM(44): HEADERS
:method = CONNECT
:protocol = connect-ip
:scheme = https
:path = /proxy?target=target.example.com&ipproto=132 // SCTP
:authority = server.example.com

STREAM(44): CAPSULE
Capsule Type = REGISTER_DATAGRAM_CONTEXT
Context ID = 0
Context Extension = {}
IP Flow Forwarding

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STREAM(44): HEADERS
:status = 200

STREAM(44): CAPSULE
Capsule Type = ADDRESS_ASSIGN
IP Version = 6
IP Address = 2001:db8::1234:1234 // IP C
IP Prefix Length = 128

STREAM(44): CAPSULE
Capsule Type = ROUTE_ADVERTISEMENT
(IP Version = 6
Start IP Address = 2001:db8::3456
End IP Address = 2001:db8::3456 // IP D
IP Protocol = 132)
IP Flow Forwarding

DATAGRAM
Quarter Stream ID = 11
Context ID = 0
Payload = Encapsulated SCTP/IP Packet

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Proxied Connection Racing

STREAM(44): HEADERS
:method = CONNECT
:protocol = connect-ip
:scheme = https
:path = /proxy?ipproto=17
:authority = server.example.com

STREAM(44): CAPSULE
Capsule Type = REGISTER_DATAGRAM_CONTEXT
Context ID = 0
Context Extension = {}
Proxied Connection Racing

STREAM(44): HEADERS
:status = 200

STREAM(44): CAPSULE
Capsule Type = ADDRESS_ASSIGN
IP Version = 4
IP Address = 192.0.2.3
IP Prefix Length = 32

STREAM(44): CAPSULE
Capsule Type = ADDRESS_ASSIGN
IP Version = 6
IP Address = 2001:db8::1234:1234
IP Prefix Length = 128

STREAM(44): CAPSULE
Capsule Type = ROUTE_ADVERTISEMENT
(IP Version = 4
Start IP Address = 198.51.100.2
End IP Address = 198.51.100.2
IP Protocol = 17)
(IP Version = 6
Start IP Address = 2001:db8::3456
End IP Address = 2001:db8::3456
IP Protocol = 17)
Next Steps

Is this the right starting place for the protocol?

Ready to adopt?