



Template-Driven HTTP Request Proxying

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What is an HTTP Request Proxy?

- Classic HTTP forward proxy (predates CONNECT).
- Used to implement shared caching on campus networks in the 1990s.
- Now widely used in infrastructure/enterprise contexts to delegate request processing and enable policy enforcement.

HTTP/1.1: Special “absolute URI” request form

```
GET https://dest.example/path HTTP/1.1
Host: dest.example
```

HTTP/2+: No special request form.



Limitations

- **No Virtual-hosting (e.g. CDN)**
 - Currently every distinct forward proxy needs a unique server IP address.
 - Bad for privacy, cost, and operational complexity
- **No Path-separation**
 - Can't host multiple proxy services on one domain, at different paths for different behaviors
 - No configuration via URL parameters (`?debug=1&country=ZZ`)
- **Misdirection attack vulnerability**
 - Forward-proxies that use different ports on the same hostname can be swapped by an attacker.

Templated proxies for UDP, IP, TCP ... HTTP?

Original request:

HEADERS

```
:scheme = https
:authority = api.example
:path = /path
:method = PATCH
content-type = application/example
```

Forward Proxy Template:

```
https://proxy.example/http
{?target_uri}
```

Transformed request:

HEADERS

```
:scheme = https
:authority = proxy.example
:path = /http?target_uri=
      https%3A%2F%2Fapi.example%2Fpath
:method = PATCH
content-type = application/example
proxy-authorization = ...
```

...



Legacy configuration support

- What if my configuration mechanism can only do `host:port`?
- **Default template**, just like `CONNECT-UDP`, `CONNECT-TCP`, etc.:
`https://$PROXY_HOST:$PROXY_PORT/.well-known/masque/http/{target_uri}`
- Problem: **Can't probe for this**. (A 404 response could result from successful proxying...)
- Solution: Explicit upgrade signal for legacy configurations
 - `Proxy-Status: proxy-no-template.example.org; use_template="default"`
- Bonus: Template-oriented redirection
 - `use_template="https://proxy.example.org/beta{?target_uri}"; details="You have been assigned to the beta test group"`
 - Could be useful for `CONNECT-*`!



Status

- Recently implemented in g3proxy: <https://github.com/bytedance/g3/pull/826>
 - By Zhang Jingqiang of ByteDance
- Open questions
 - POST Binary HTTP Messages instead?
 - Capsule Protocol!?
 - Make Proxy-Status mandatory so it can be used for probing the default template?
 - Adopt?