

HTTP over Bundle Protocol

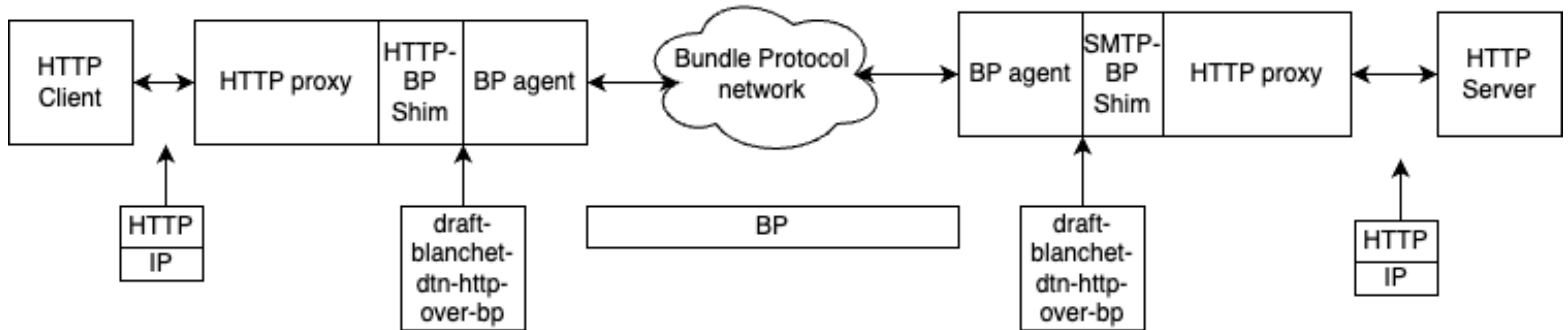
draft-blanchet-dtn-http-over-bp

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Rationale

- Motivation: run applications over BP.
 - Let's do the most used application framework on Internet: HTTP
 - Enables reuse of all tools we are using for current Internet applications: JSON, REST API, etc...
 - A space application developer is « just » a regular Internet Application developer (with some « best practices »)
- HTTP Queries and responses from/to/between planetary bodies
- HTTP has by itself no notion of time.
- Bundle Protocol used between planetary bodies (and also on)
- IP network on planetary bodies (see various space agencies architecture documents)
- Instead of inventing a new Application layer protocol (and applications) over BP, then re-use HTTP (protocol and applications) but encapsulate into BP.
- Both sides are using « regular » HTTP software and protocols

An Example



HTTP Encapsulation into BP

- Encapsulate the whole request and response into a bundle.
- If content is too large for one bundle, use bundle fragmentation.
- Both endpoints have to keep track of each connection being en/de-capsulated, therefore, an random id (UUID) is added in front of the HTTP payload
- Since http payloads may be « continuous » (like video streaming over http), both endpoints have to know when it is done or more is expected. Therefore, a counter is added in front of the HTTP payload. Value of zero when no more.
- This method was implemented in our C++ BPv6 implementation and was able to view streaming over DTN without any issue.

Considerations

- While one could fetch an HTML page and it works, the typical HTML page containing a lot of « objects » to further fetch would then be generating many requests. Not the right time to make « beautiful » web pages. However, for applications using REST API, JSON, and HTTP semantics, all good.
- Negotiations such as URL Redirection or else can be used and will work, but not recommended, as this will further delay the actual arrival of the data.
- Request IANA BP service number assignment
- Careful considerations for time related headers: cache-control, etc... (Not in current draft, will be in next rev)
- Degenerated case: a spacecraft is a BP node. The HTTP server and the BP node may all be on the same host.
- Operations of IP networks and domain name infrastructure: yes, there are operational considerations on running DNS (and IP network in general) on planetary body: out of scope of this document but it is being worked on.

Comments Received

- Mark Nottingham: looks fine.
- Brian Sipos:
 - Multiple HTTP versions; use RFC9292. Will do in next rev.
 - Connection id and seq number in CBOR for space efficiency: disagree. Text won't text much compared to payload and is much easier to debug. Seq number will be pretty small in most cases, so no real gain for encoding in CBOR. Moreover, the shim itself does not have a CBOR lib, so why add it?
 - Multiplexing: yes. Will describe a bit the internals of the shim (i.e. keep mappings) in next rev.
 - Unsolicited response for preemptive caching: HTTP2 and HTTP3 already are bidirectional. Need to look at it.

Next Steps

- WG Adoption
- Working on an implementation using nginx and uD3TN (AAP is simple and easy for quick implementation). When done, will post so people can join and try.
- If you plan to implement, please send me a note so we can arrange some interop testing.
- Specification: [draft-blanchet-dtn-http-over-bp](#)
- Looking for more comments
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