z/TPF Enhanced HTTP Client Support for HTTP/2

Web Services Subcommittee

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Executive Summary

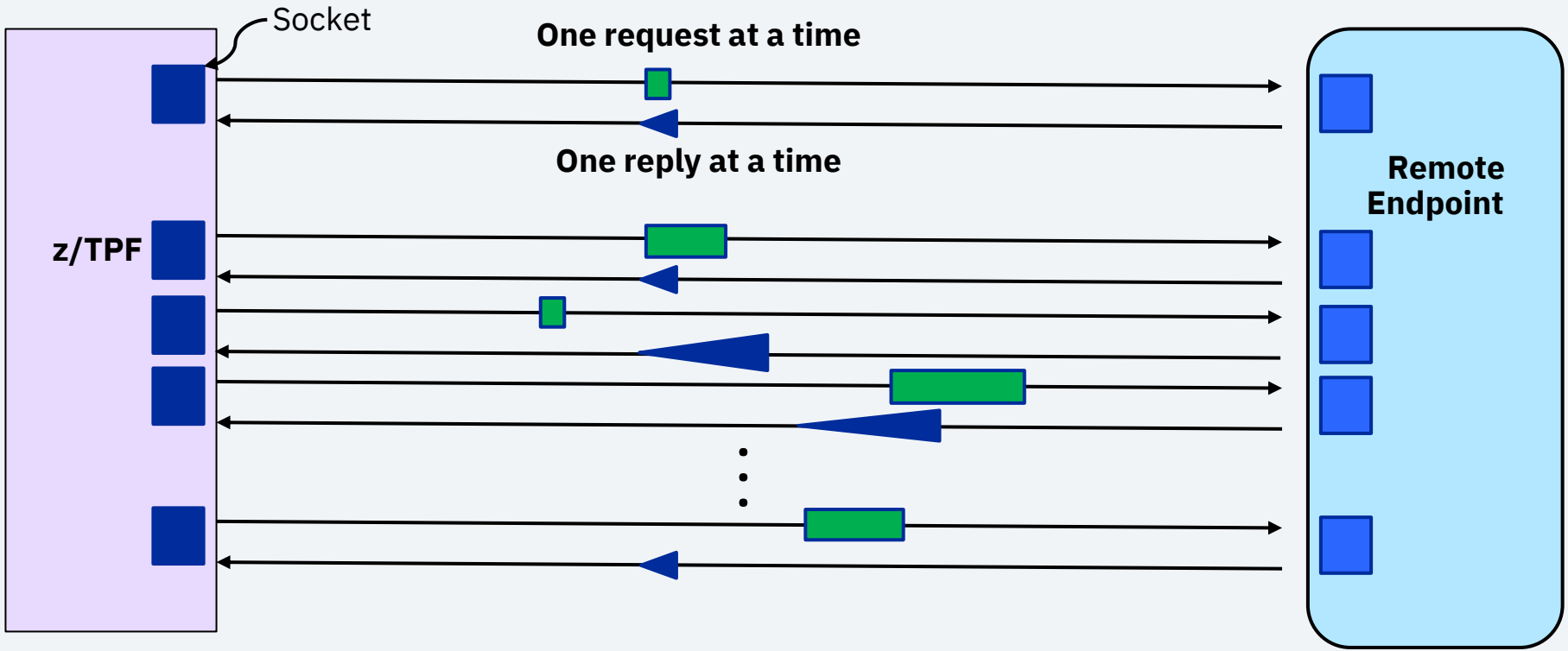
Yumi
Systems Architect

This support reduces the number of sockets required when a large number of HTTP messages are exchanged between the z/TPF enhanced HTTP client and a remote server. No application changes are required.

Problem Statement

HTTP/1 sessions are restricted to a single request/reply model, which requires a large number of sockets to support a large number of concurrent requests to the same server.

As-Is: HTTP/1

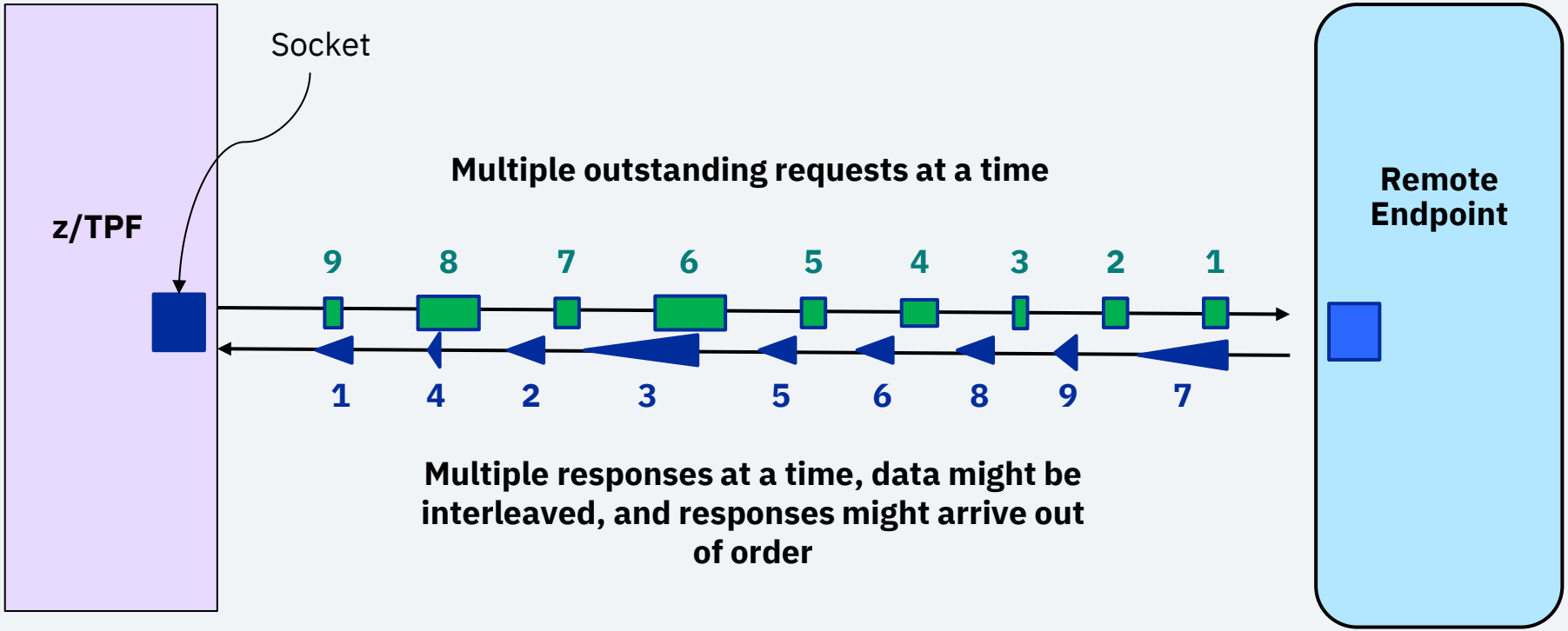

Socket
One request at a time
One reply at a time
z/TPF
Remote Endpoint

Protocol Differences

HTTP/1	HTTP/2
• Single request/reply model • Text-based format	• Multiplexing • Binary-based format

To-Be: HTTP/2

In practice, an **HTTP/2 stream** refers to a single request and reply flowing over the connection.



Supported APIs

- The HTTP/2 protocol will be supported for the existing **`tpf_httpSendRequest`** and **`tpf_httpSendAsyncRequest`** APIs
  - No application changes for API calls that use persistent sessions
- HTTP/2 support for REST consumer will also be included, as it uses the above APIs internally

Understanding When HTTP/2 Is Used

- The **`tpf_httpSendRequest`** and **`tpf_httpSendAsyncRequest`** APIs require **`host`** and **`httpVersion`** as input parameters
- If **`host`** maps to a high-speed connector group, and that group has enabled HTTP/2, then the request will be sent over a persistent HTTP/2 connection
  - This is true even in the case where **`httpVersion`** on the API call specifies HTTP/1. This enables migration to HTTP/2 without having to update your applications.
- Otherwise, if **`host`** does not map to a high-speed connector group and **`httpVersion`** is HTTP/2, the request will be sent over a nonpersistent HTTP/2 connection

Enabling HTTP/2 for Nonpersistent Sessions

- If a particular API call does not map to a high-speed connector group, a nonpersistent session is created for the request
  - After the response is received, the nonpersistent session is closed, as today
- To enable the nonpersistent session to be established with HTTP/2, specify the **`HTTP_2`** value for the **`httpVersion`** on the **`requestParms`** input to the **`tpf_httpSendRequest`** or **`tpf_httpSendAsyncRequest`** API
  - Example: `requestParms.httpVersion = HTTP_2;`
- For the REST consumer, a new **`HTTP2`** option can be specified for the **`httpProtocol`** parameter in the REST service descriptor
  - This is equivalent to setting the **`httpVersion`** parameter mentioned previously

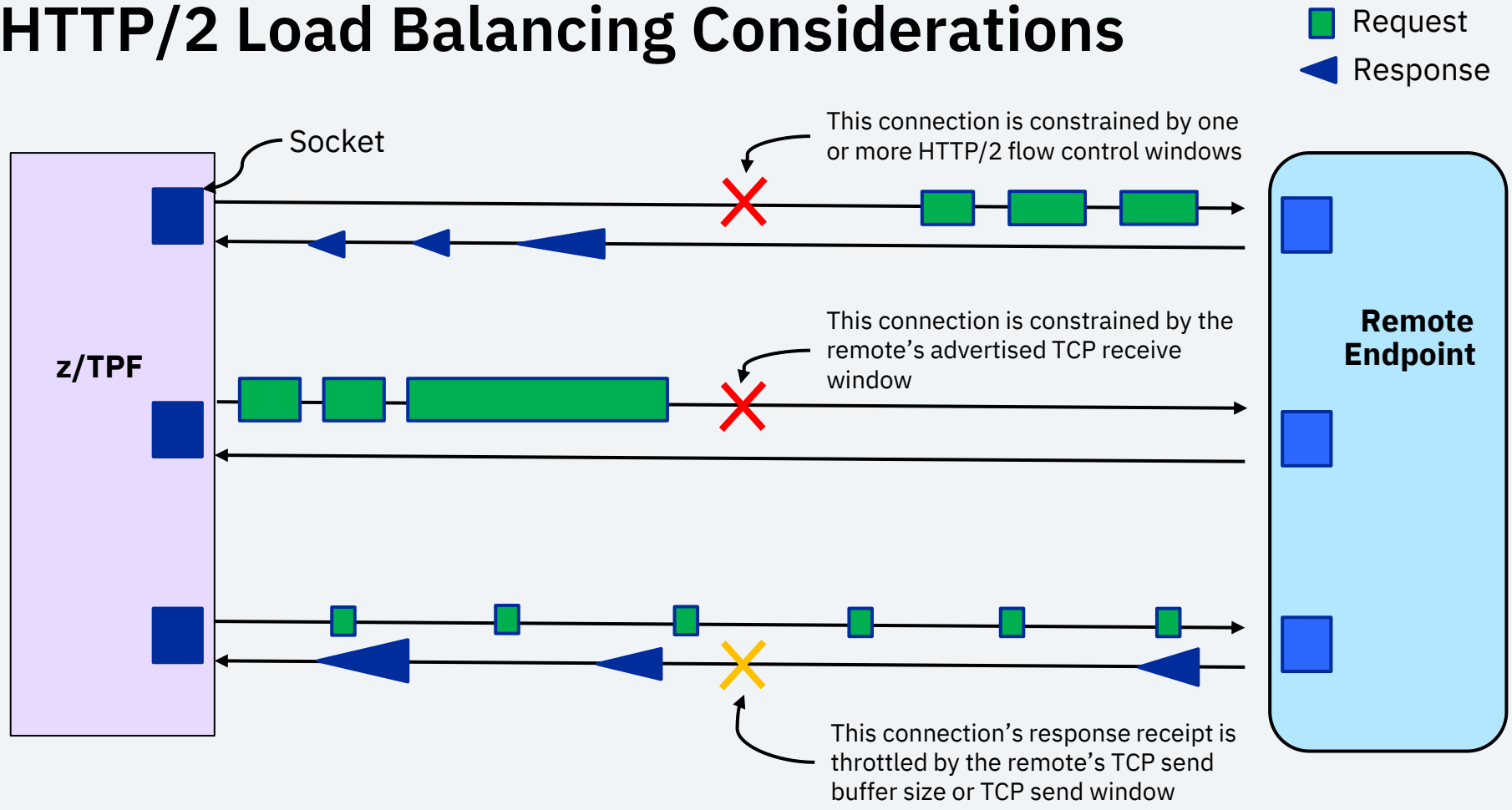
Enabling HTTP/2 for High-Speed Connector Groups (Persistent Sessions)

- The **groupType** parameter in the endpoint group descriptor file can now specify **HTTP2**
  - Example: `<tns:groupType>`**HTTP2**`</tns:groupType>`
- Note: The **groupType** applies to all connections created for the endpoint group
  - Therefore, HTTP/1 and HTTP/2 connections **cannot** coexist for the same group

Load Balancing for Persistent HTTP/2 Connections

- For HTTP/1 high-speed connector groups, socket selection is easier compared to HTTP/2, because the connections exist in a binary state of either in use or not
- However, because HTTP/2 supports multiplexing, we must be cautious to prevent any single persistent connection from becoming overloaded with too many concurrent requests
  - IBM is currently evaluating different socket selection algorithms, considering both the HTTP/2 and TCP connection states, to avoid overloading a connection with requests
  - The same considerations also factor into socket expansion (for example, when do we create another session?)

HTTP/2 Load Balancing Considerations



HTTP/2 Client Summary

- Support high throughput of HTTP requests with reduced number of sockets
- Migrate existing high-speed connector endpoint groups to HTTP/2 without application changes
- Ability to communicate with servers that do not support HTTP/1
- Targeting 2H 2025

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Target personas

- Application developer
- Systems administrator

Sponsor user meetings are in progress

Interested? Contact

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Thank you