TLS Support for z/TPF High Speed Connector and Enhanced HTTP Client

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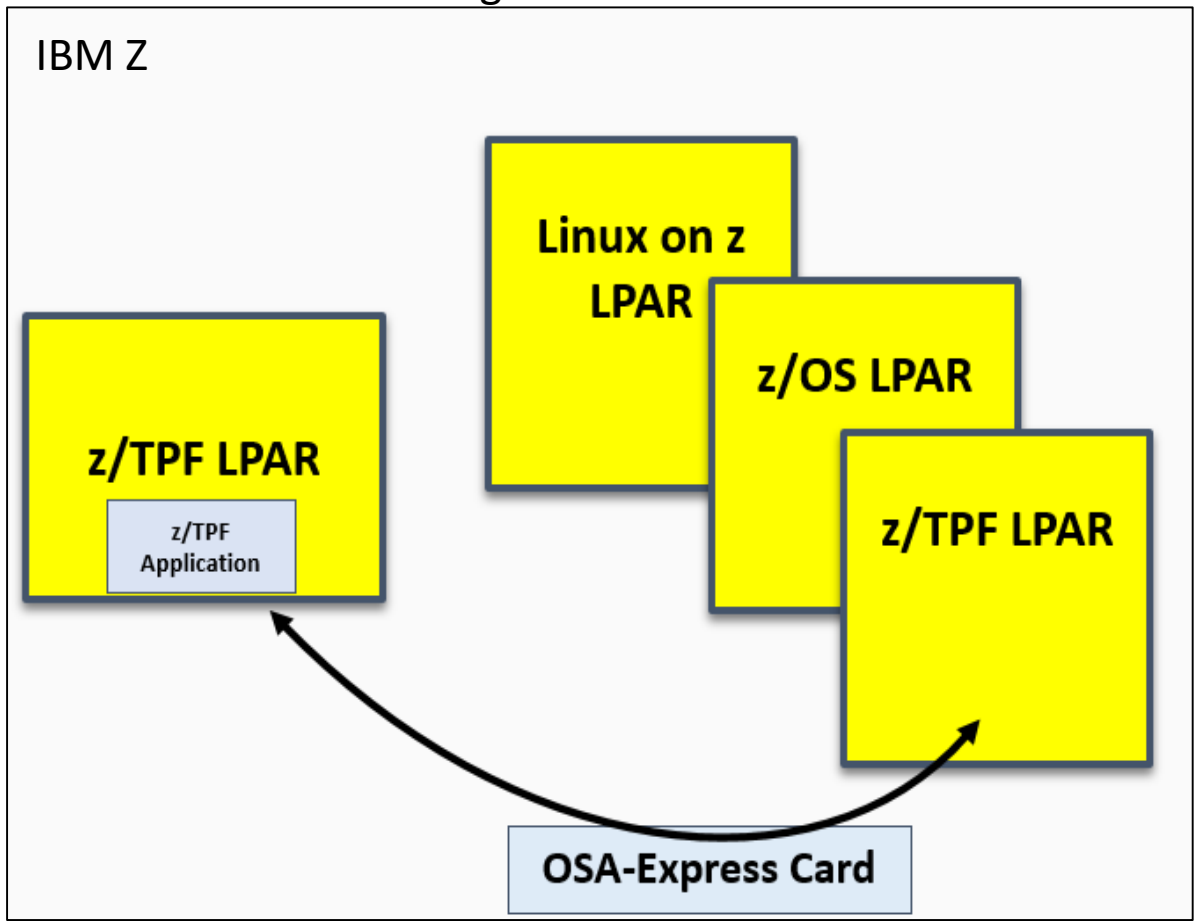
Agenda

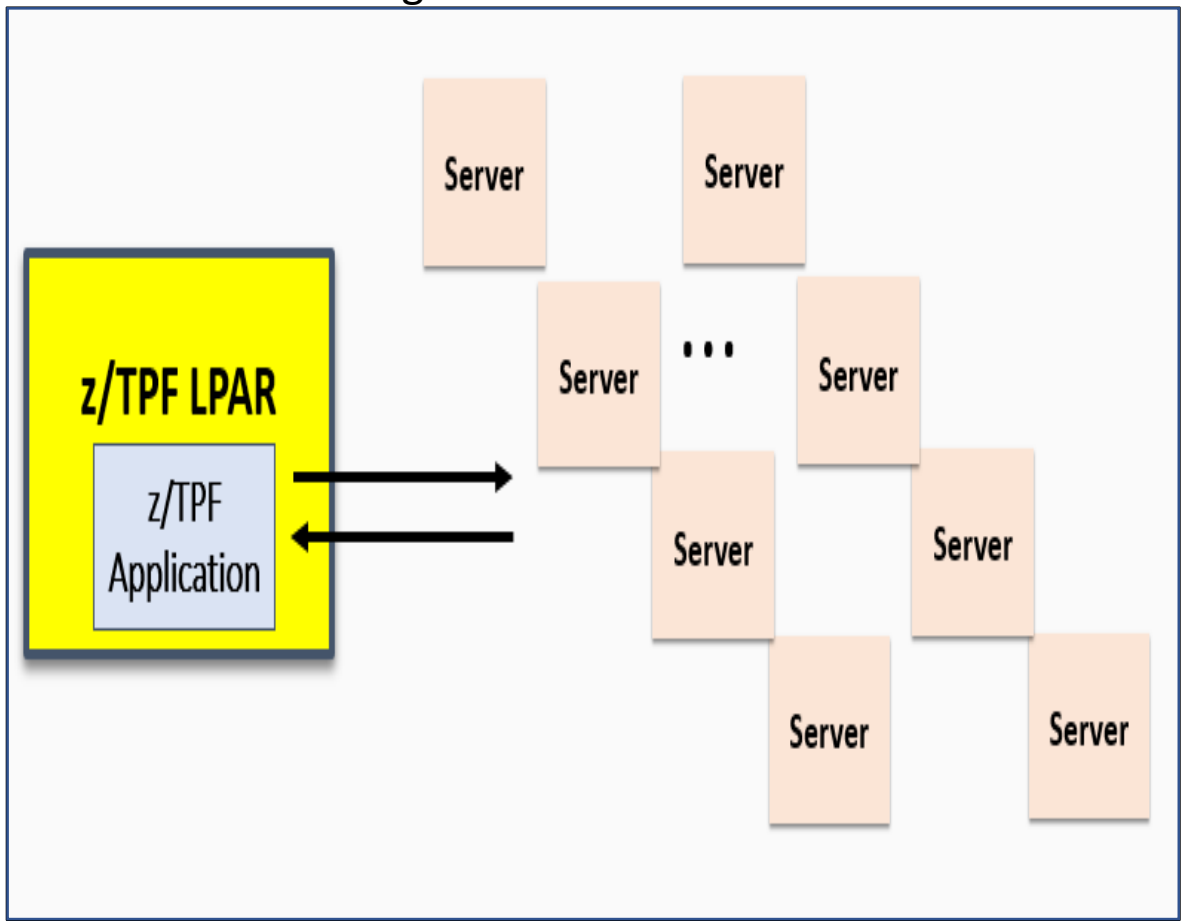
- Background
  - High Speed Connector
  - Enhanced HTTP Client
- Problem Statement
- Solution
  - Enabling z/TPF High Speed Connector, Enhanced HTTP Client and REST consumer for TLS.

Background – High Speed Connector Use Cases

Communicating with LPARs in Same CEC



Communicating with local or remote server farm



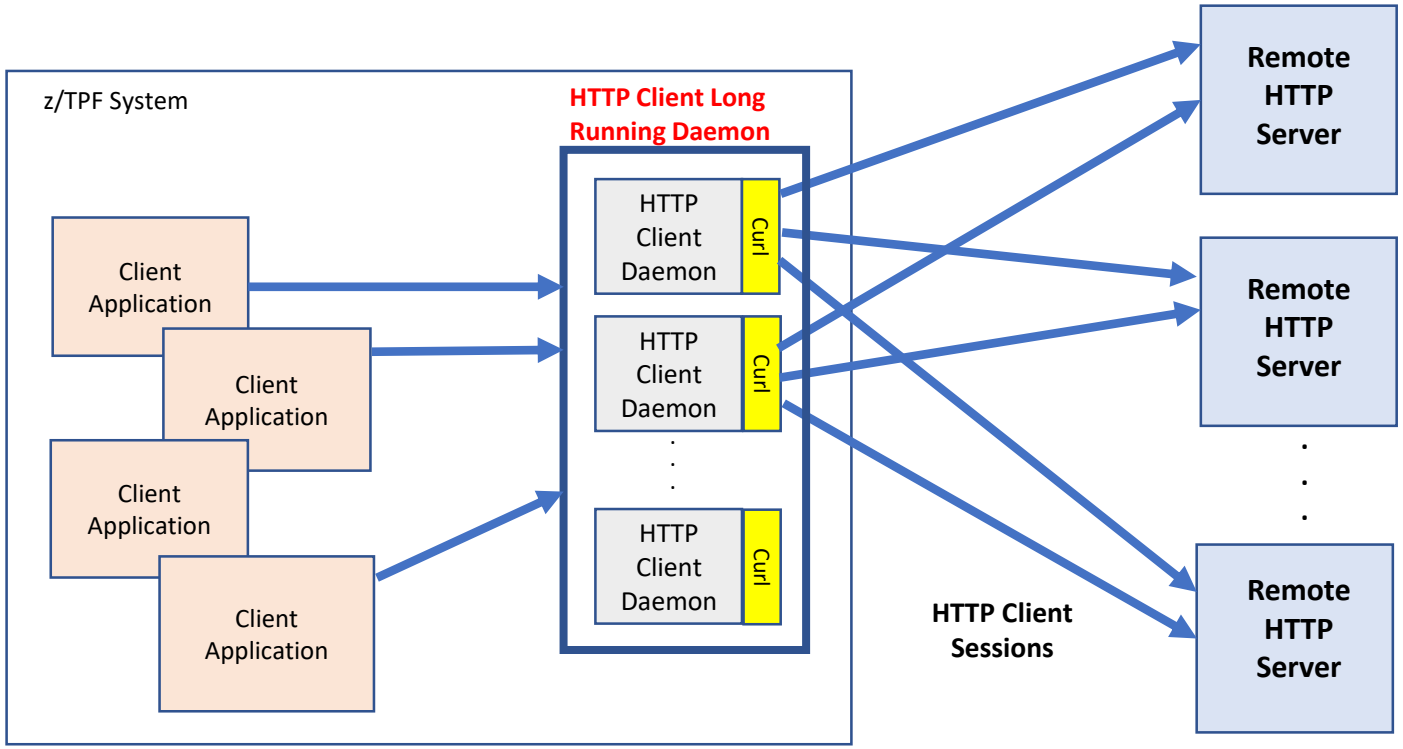
Background – High Speed Connector

- Administrator can define groups of servers
  - Defined through configuration
- The z/TPF system handles
  - Load balancing
  - Error handling and automatic session establishment
  - Statistics
  - Topology can be changed without affecting existing applications!

- Easier for applications to communicate with remote servers
  - Single API to send requests

- Delivered 3Q 2016, PUT 13 – APAR PJ43832
  - API for asynchronous responses delivered in Dec 2018 - PJ44733

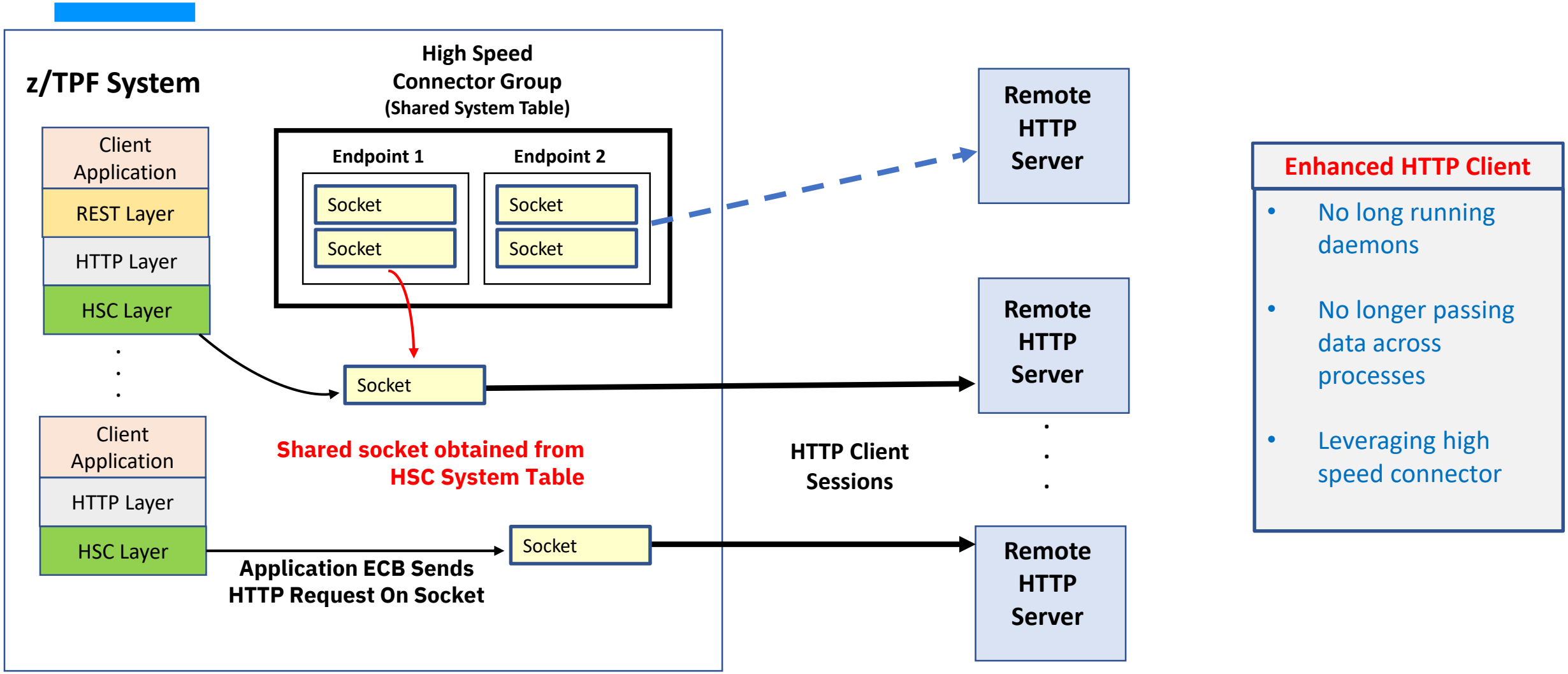
Background – Original HTTP Client



Original HTTP Client

- Long Running Daemons are not automatically recycled.
- Inefficient model to pass data across processes.
- Current libCurl package does not support the latest TLS standards.
- REST consumer would require significant changes to original HTTP client support

Background – Enhanced HTTP Client / REST Consumer



Enhanced HTTP Client

- No long running daemons
- No longer passing data across processes
- Leveraging high speed connector

Background – Enhanced HTTP Client / REST Consumer

- Delivered 4Q 2017, PUT 14 (PJ44733)
- Better performing HTTP client for z/TPF
  - Reduction of CPU usage in the HTTP layer up to 80%

- REST Consumer Support
  - Requires the Enhanced HTTP Client
  - Delivered 4Q 2017, PUT 14 (PJ45005)

- 100% TE-Eligible

Problem

- The High Speed Connector, Enhanced HTTP Client, or REST Consumer does not support Transport Layer Security (TLS)
  - Ability to communicate across secure sessions does not exist.

Example HTTP/REST Endpoint Configuration

```
<tns:EndpointGroup xmlns:tns="http://www.ibm.com/xmlns/prod/ztpf/endpoint"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.ibm.com/xmlns/prod/ztpf/endpoint /sys/tpf_pbfiles/tpf-
    fdes/schema/tpf_endpoint_schema.xsd ">
  <tns:Endpoint>
    <tns:endpointName>tpf1hts</tns:endpointName>
    <tns:role>PRIMARY</tns:role>
    <tns:destination>tpfLnx.pok.ibm.com1:71</tns:destination>
    <tns:startSocket>0</tns:startSocket>
    <tns:maxSocket>10</tns:maxSocket>
    <tns:bufferSendSize>1048576</tns:bufferSendSize>
    <tns:bufferReceiveSize>1048576</tns:bufferReceiveSize>
  </tns:Endpoint>
  <tns:groupName>tpfLnx</tns:groupName>
  <tns:groupType>HTTP</tns:groupType>
  <tns:TLS>YES</tns:TLS>
  <tns:groupDescription>Used to communicate with
       zLinux to getFlightInfo </tns:groupDescription>
  <tns:qMaxDepth>100</tns:qMaxDepth>
  <tns:qThreshold>80</tns:qThreshold>
  <tns:syncTimeout>3000</tns:syncTimeout>
  <tns:heartbeatInterval>0</tns:heartbeatInterval>
  <tns:aliasHostname>tpfLnx.pok.ibm.com</tns:aliasHostname>
  <tns:aliasHostname>tpfLnx.pok.ibm.com:71</tns:aliasHostname>
</tns:EndpointGroup>
```

One or more endpoint Definitions in group

Indicates Group is for HTTP/REST

Indicates Group is TLS

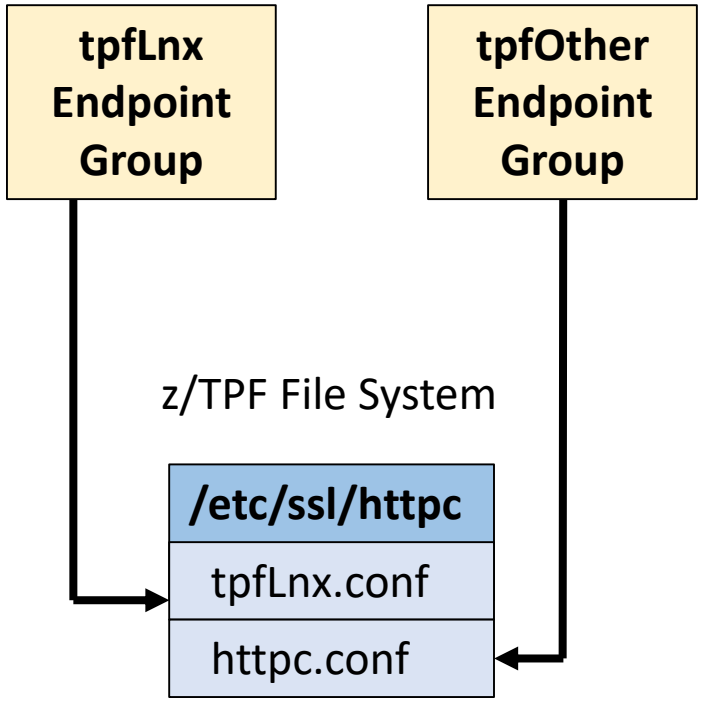
*z/TPF will look for TLS configuration

Hostnames associated with this group (Only valid for groupType:HTTP)

Enhanced HTTP Client - TLS Configuration Information

- If the endpoint configuration is for HTTP
  - The TLS HTTP client configuration file(s) reside in /etc/ssl/httpc/
  - Same location as original HTTP client for ease of migration

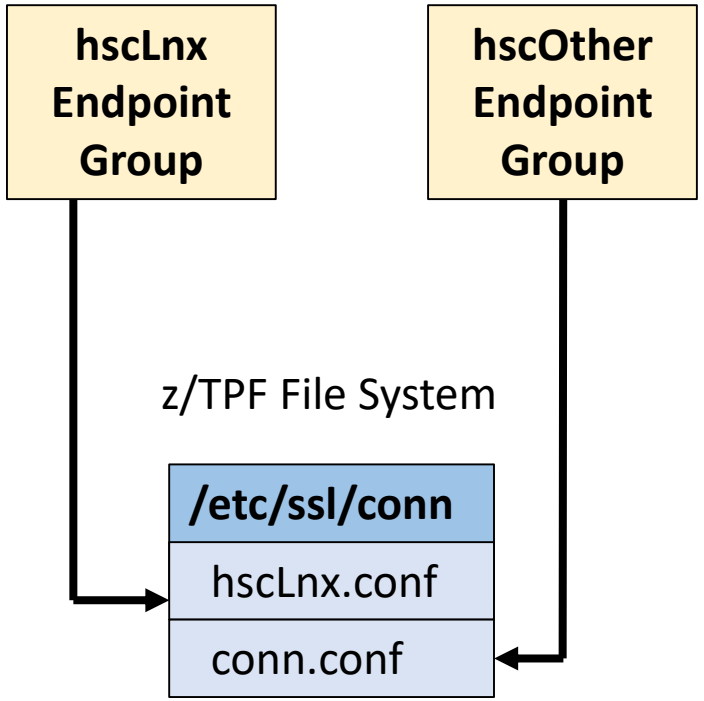
- Naming convention
  - *nnn*.conf : where *nnn* is the name of the HTTP endpoint group
  - httpc.conf can be coded as the default



High Speed Connector - TLS Configuration Information

- If the endpoint configuration is not for HTTP
  - The TLS HTTP client configuration file(s) reside in /etc/ssl/conn/

- Naming convention
  - *nnn*.conf : where *nnn* is the name of the high speed connector endpoint group
  - conn.conf can be coded as the default



Example TLS Configuration File

- Format of the TLS configuration file for High Speed Connector or Enhanced HTTP client is the same
  - Same configuration file format as MQ, INETD, etc.

```
VERSION=TLSv1_2
CIPHER=AES256-SHA256
VERIFYPEER=YES
CAINFO=/certs/cacert.pem
CERTIFICATE=/certs/ntpf2048_cert.pem
CERTTYPE=PEM
KEY=/tpfpubk/ntpf2048.pem
KEYTYPE=PEM
```

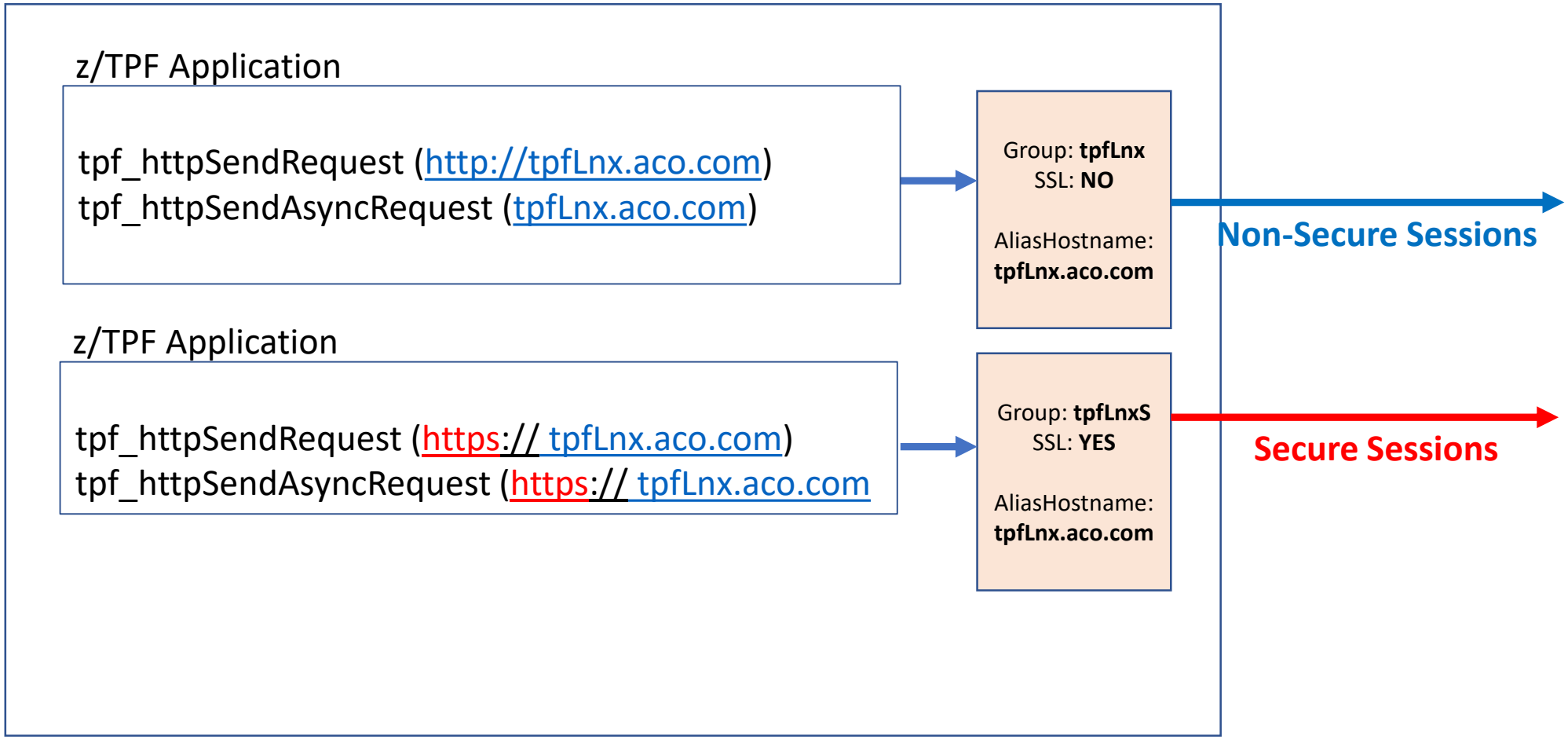
Required set of Parameters

Only required when server requests client authentication

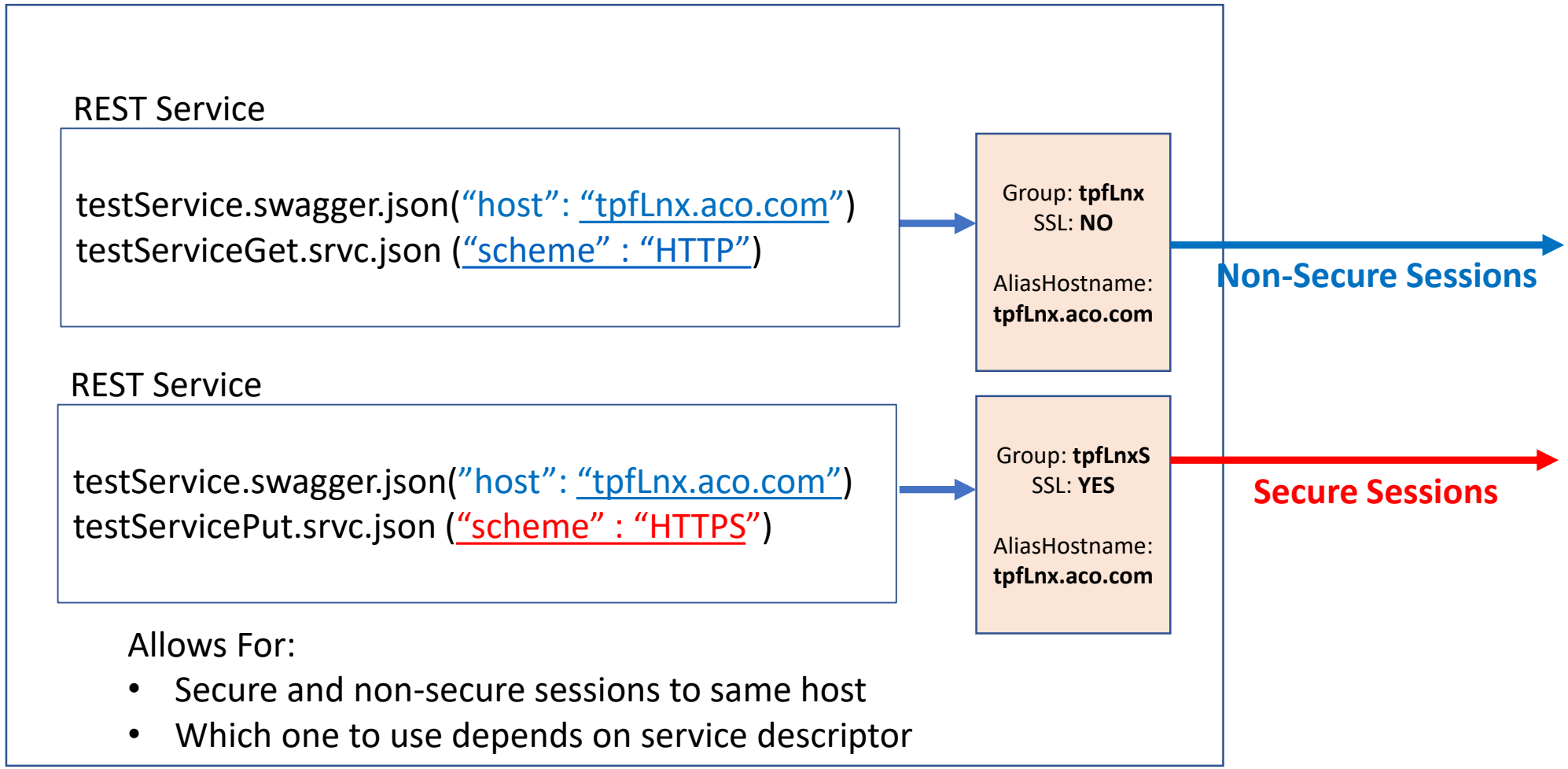
Enhanced HTTP Client: Non-Persistent Connections

- The enhanced HTTP Client provides the ability to send HTTP requests across a non-persistent HTTP client session.
  - If an endpoint group for the host specified by the application is not found
    - We create a session that will only remain active for the life of the application request.
    - Session is torn down upon receiving the response.
- Transport Layer Security for non-persistent HTTP client remains the same as the original HTTP Client
  - TLS configuration file in /etc/ssl/httpc must be names "*host*.conf", where *host* is the host the application is connecting to.
    - For example, airco.payment.com
  - If configuration file for host is not found, the default file httpc.conf is interrogated for the TLS configuration

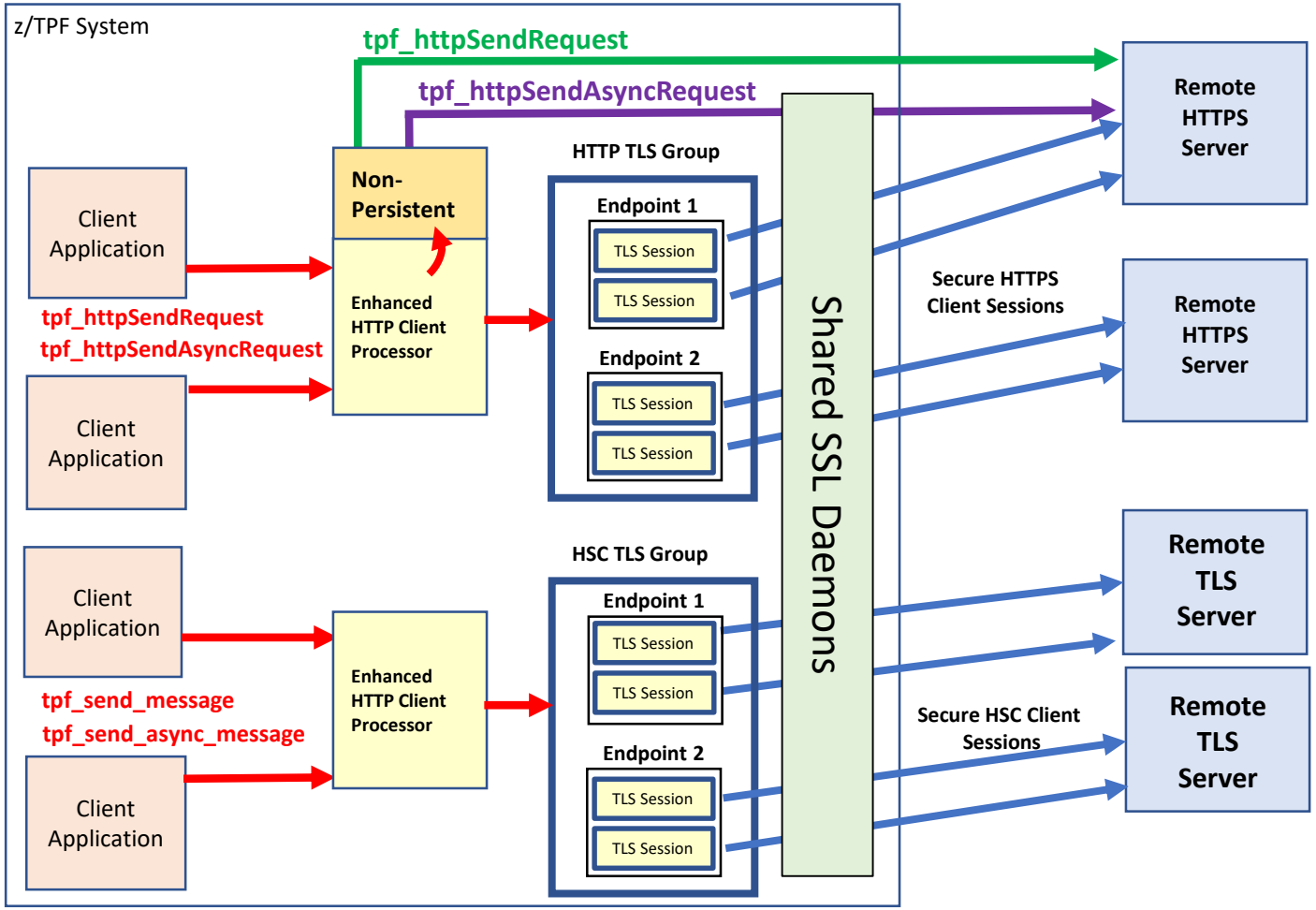
Remote Systems with SSL and non-SSL Servers



REST Consumer Layer



Enhanced HTTP and High Speed Connector TLS Architecture



- Architecturally TLS vs non-TLS is very similar
- The z/TPF Shared SSL Daemons are required for Enhanced HTTP or High Speed Connector across TLS.
  - Asynchronous API processing
  - Shared Sessions

Value Statement

- z/TPF system managed groups of SSL Sessions to remote servers.
  - Session establishment and management is handled by the z/TPF system

- Enables z/TPF applications to communicate with secure cloud based services.

Recap

- TLS Support for High Speed Connector, Enhanced HTTP Client, REST Consumer
  - PJ45258
  - Delivered October 2018, PUT 15
    - PJ45493 is a prerequisite (REST Consumer TLS Infrastructure)

Thank You!

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