z/TPF V1.1

2013 TPF Users Group

Hardware Cryptography and z/TPF

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AIM Enterprise Platform Software
IBM z/Transaction Processing Facility Enterprise Edition 1.1

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Overview of Current Support on z/TPF

Types of Hardware Cryptography on System z

- **Central Processor Assist for Cryptographic Functions (CPACF)**
  - Coprocessor integrated into the multi-chip module (MCM)
  - Each CPACF is shared by 2 cores
- **Crypto Express**
  - Physical cards that you plug into the processor
  - 1 feature = 1 physical card
    - 1 Crypto Express3 feature = 2 Crypto Express3 adapters
      - Each adapter operates independently
    - 1 Crypto Express4S feature = 1 Crypto Express4S adapter
  - zEC12 supports Crypto Express3 and Crypto Express4S

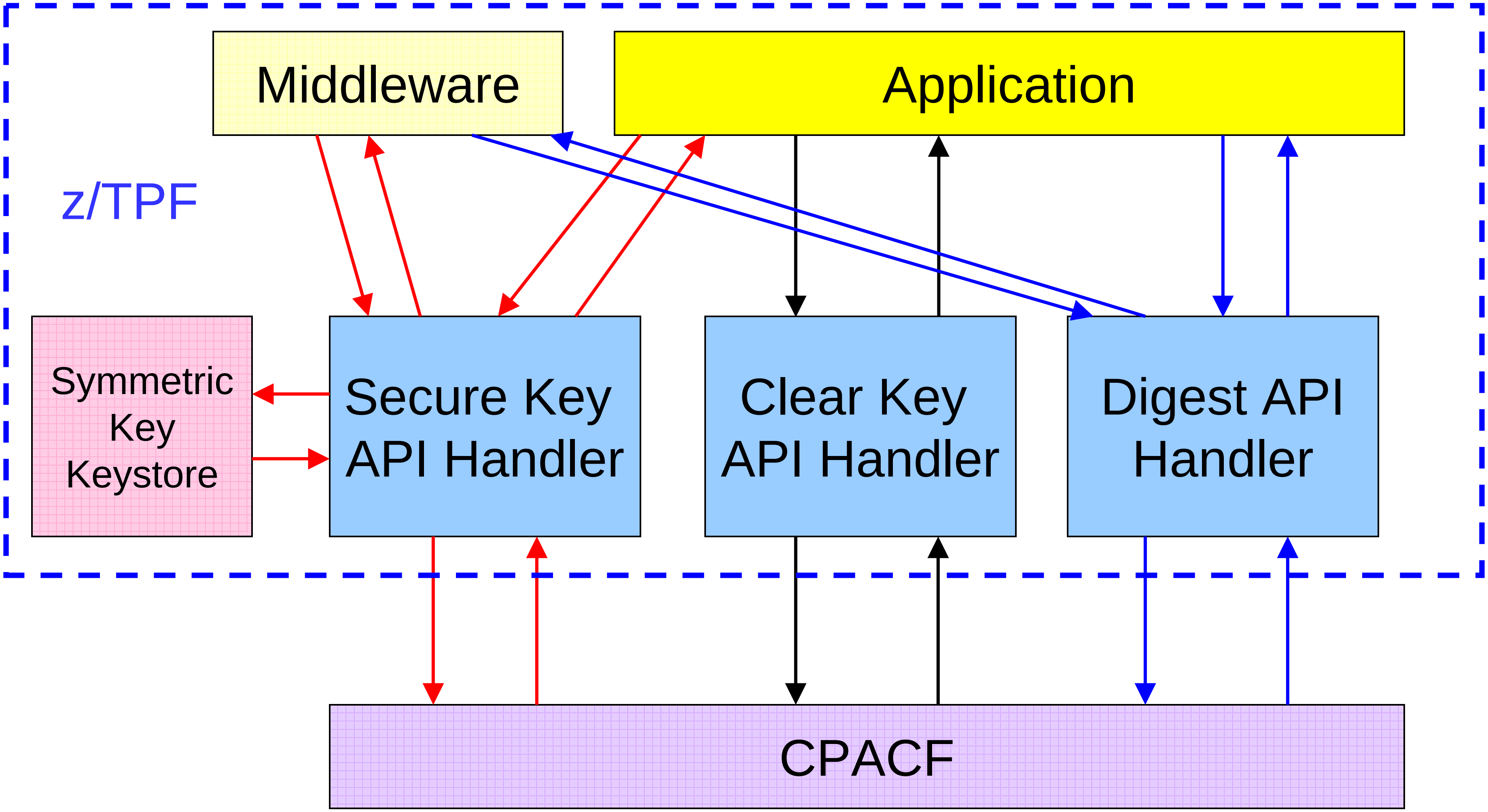
Basic z/TPF Crypto Support

- **Clear key APIs**
  - Encrypt/decrypt data using DES, TDES, AES-128, or AES-256
    - Uses CPACF if the algorithm is supported by CPACF on the processor; otherwise, software is used
  - Key management is user responsibility
- **Digest APIs**
  - Create/verify digest of data using SHA-1 or SHA-256
  - Requires that the CPACF on the processor supports the algorithm

Secure Symmetric Key Management Support

- **Enables you to create and manage symmetric encryption keys in a secure manner**
  - DES, TDES, AES-128, and AES-256
  - Requires that the CPACF on the processor supports the algorithm
- **APIs to enable applications to protect sensitive data**
- **High performance designed for mainline application use**
- **Access controls to limit and log key usage**
- **Can help you meet the ever growing list of security and compliance standards**

z/TPF Symmetric Key Cryptography and Digest APIs



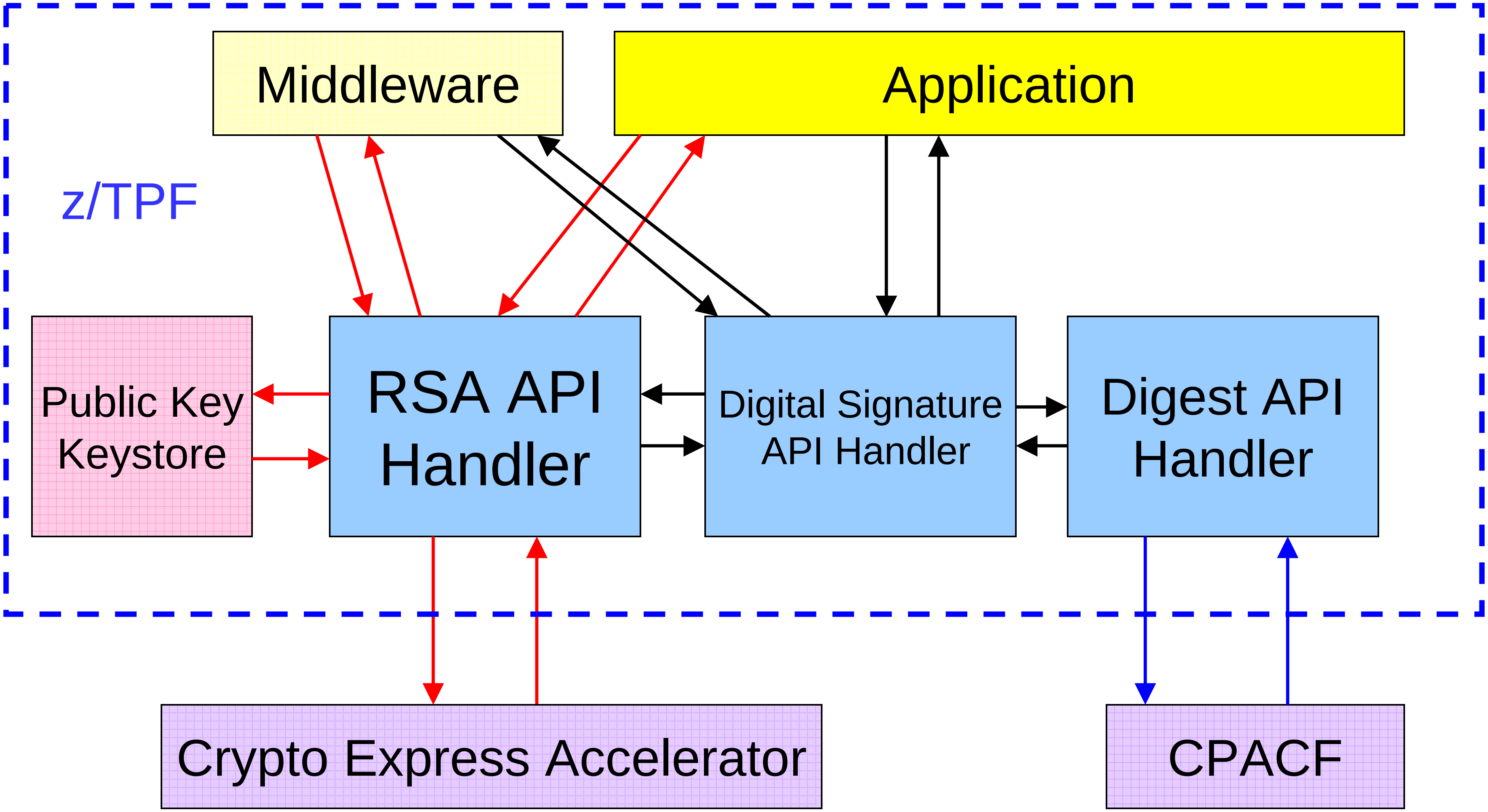
z/TPF Public Key Infrastructure (PKI) Support

- **Create and manage RSA public key pairs in a secure manner on z/TPF**
- **Use the RSA keys generated on z/TPF to create digital certificate requests as well as self-signed digital certificates**
- **Enable z/TPF SSL applications and middleware to use private keys generated by z/TPF**
- **APIs to encrypt and decrypt user data using RSA**
- **APIs to create and verify RSA digital signatures**

Crypto Express Accelerators

- **Crypto Express adapters can be configured to run in different modes**
  - An adapter runs in only one mode at a time
- **Crypto Express adapter running in accelerator mode performs RSA operations at a high rate**
  - Up to a few thousands operations per second depending on the operation type and key size
- **Required to use z/TPF PKI support**
- **Recommended to use SSL support**

z/TPF Public Key Cryptography



Crypto Express Coprocessor

Crypto Express Coprocessor

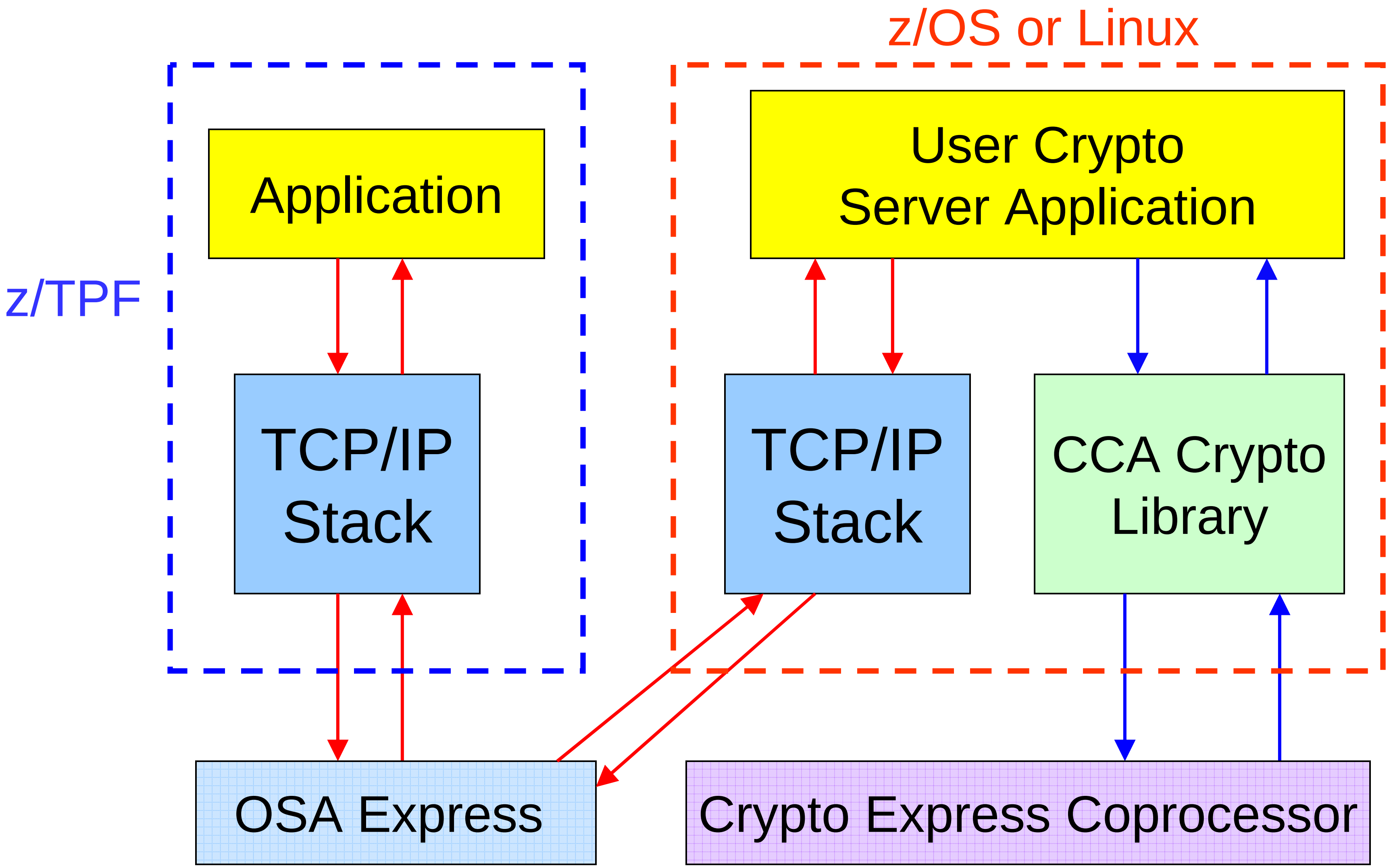
- **Crypto Express adapters can also configured to run coprocessor mode**
  - Supported by z/OS and Linux on z
  - Not currently supported by z/TPF
- **IBM Common Cryptographic Architecture (CCA)**
  - APIs support many algorithms, including banking cryptography functions
- **Customer loads master keys into the adapter using a secure trusted key entry (TKE) interface**
  - Secure, tamper-resistant card
  - FIPS 140-2 level 4 certification
- **A user key needs to be encrypted under the master key to become an operational key**

Using Another LPAR to Access Crypto Express Coprocessor

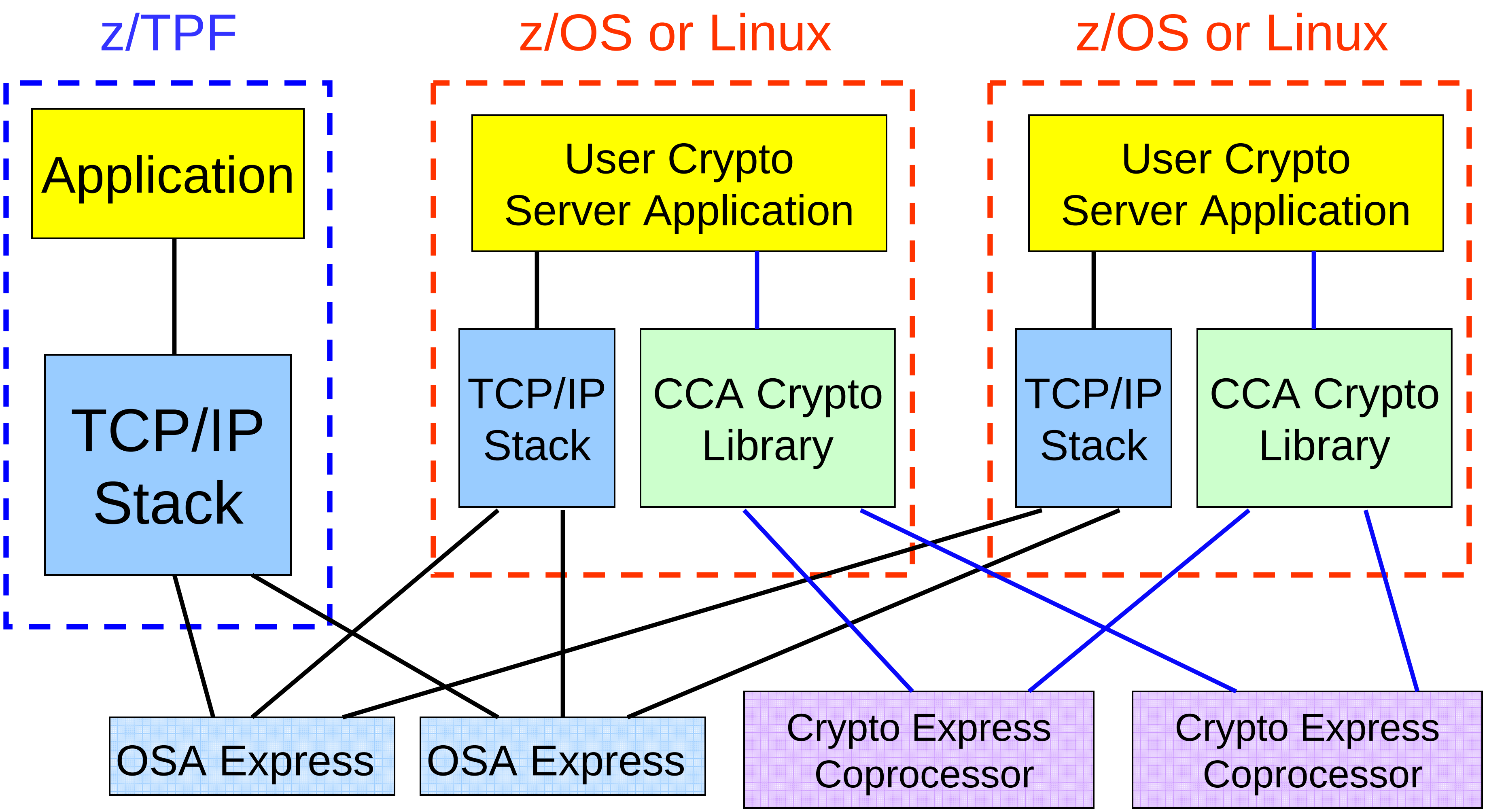
- **If you have z/OS or Linux LPARs, today you could use those LPARs to access Crypto Express coprocessors**
- **How to do this:**

1. Update your z/TPF application to send a message over TCP/IP to the other LPAR
   - Message contains the name of the CCA API along with all the input parameters to that API
2. Write a server program on the other LPAR that receives the message from z/TPF over TCP/IP, issues the appropriate CCA API, then passes the output of that API back to the z/TPF application over TCP/IP

Using Another LPAR to Access Crypto Express Coprocessor



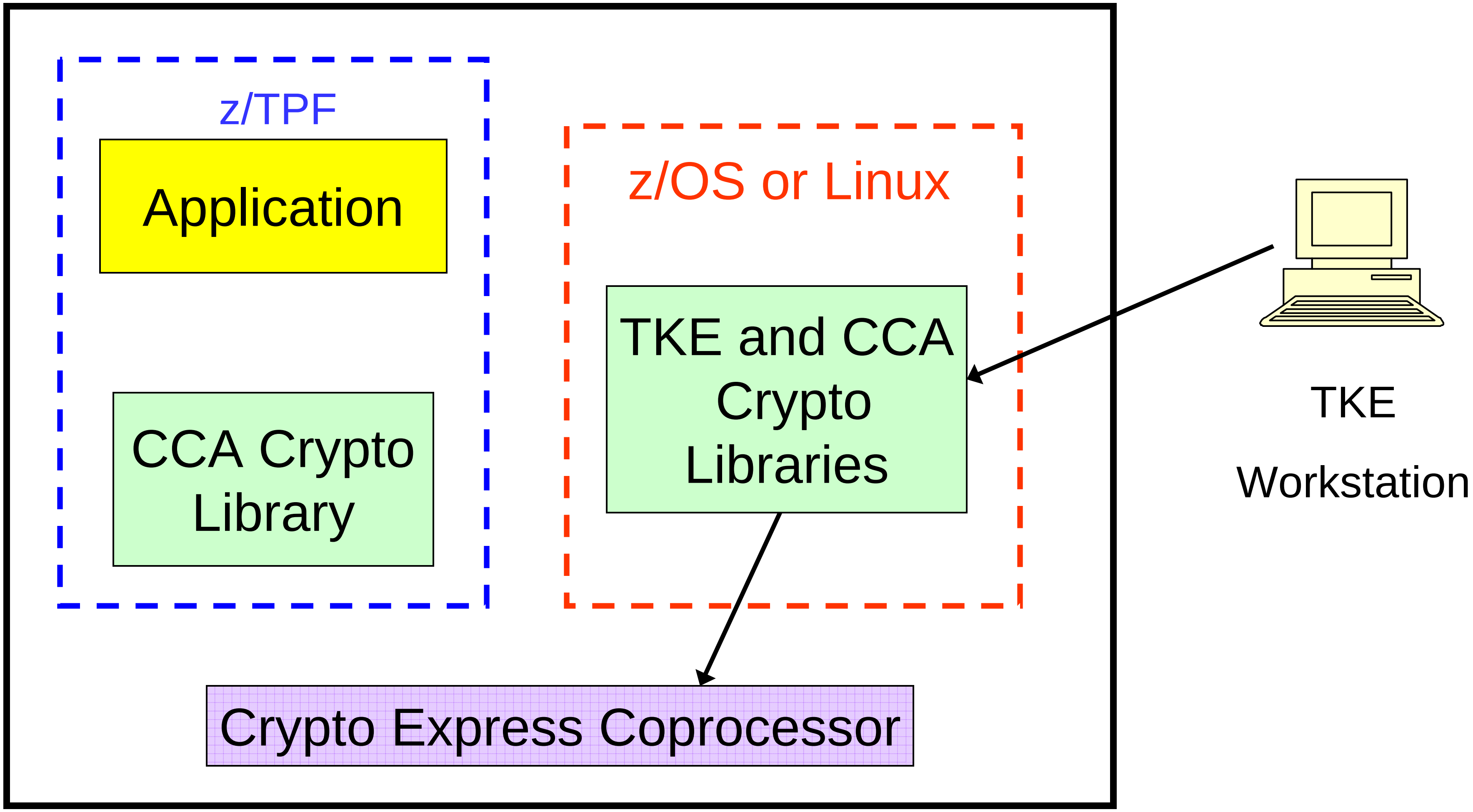
Using Another LPAR to Access Crypto Express Coprocessor High Availability Configuration



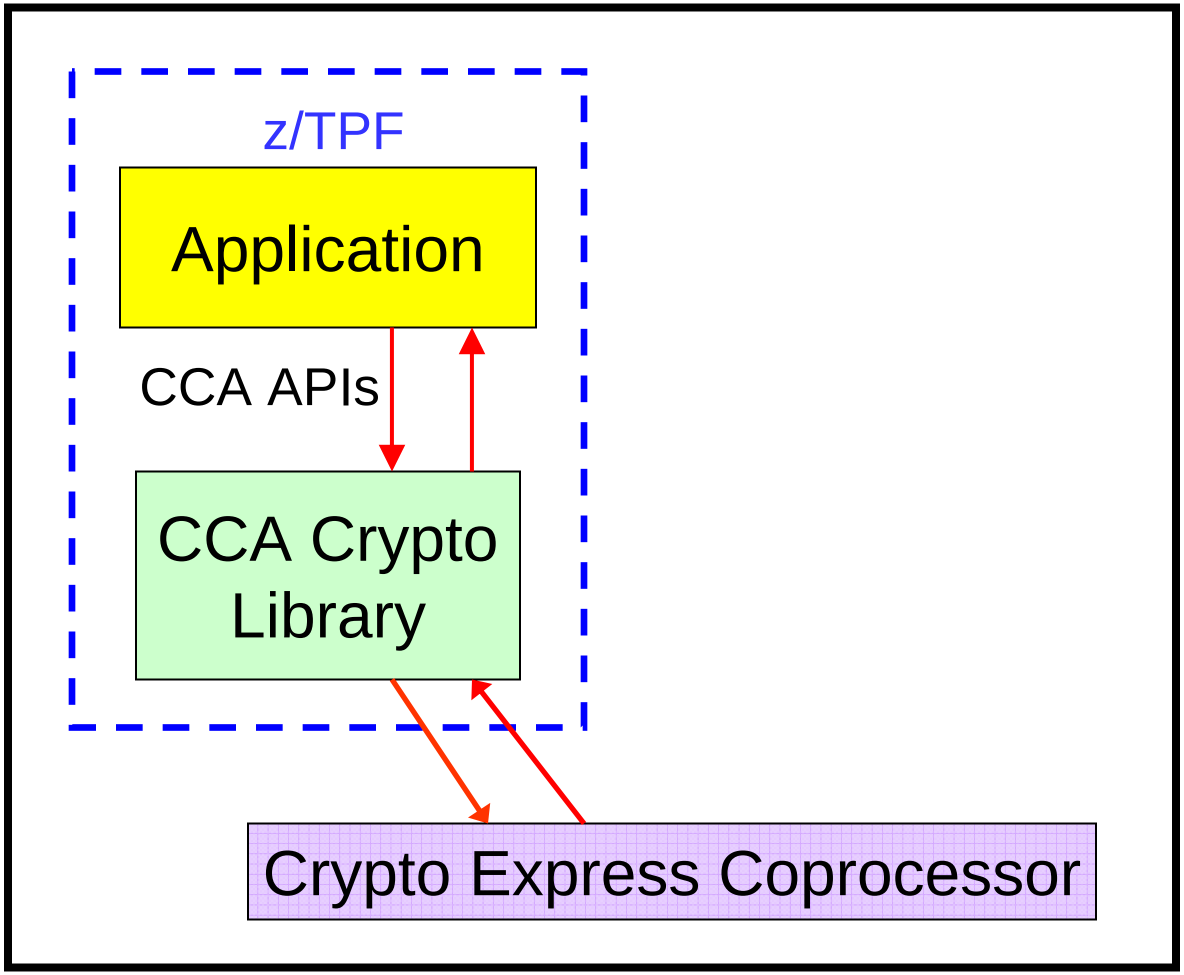
Any Interest in z/TPF Supporting Crypto Express Coprocessor Directly?

- **Port portions of the CCA library from Linux to z/TPF**
- **Need to know which APIs you want z/TPF to support**
  - **http://www.ibm.com/security/cryptocards/pciecc/pdf/SC33-8294-03.pdf** defines the APIs available on Linux for System z
  - These APIs are also implemented by the Integrated Cryptographic Service Facility (ICSF) on z/OS
- **Also need to know what options on each API you plan to use**
  - For example, some APIs have dozens of different options
- **Need to know what key management APIs you would need**
  - Creating keys, importing keys, changing master keys
- **Would need a z/OS or Linux LPAR on the processor where the Crypto Express coprocessor resides to load or change master keys on that adapter**

z/TPF with Some Crypto Express Coprocessor Support: Loading Master Keys



z/TPF with Some Crypto Express Coprocessor Support: Applications Issuing Crypto APIs



Options for Crypto Express Coprocessor Use by z/TPF

1. **Do nothing – no interest in Crypto Express coprocessor**
2. **Customer written code to access Crypto Express coprocessor on another (z/OS or Linux) LPAR**
   - IBM could provide client communications layer to do server selection, load balancing, and exchange messages with the selected server
     - This code could be general purpose for exchanging any type of user message between a z/TPF client and one of many servers
3. **z/TPF supports a limited subset of the CCA APIs to access Crypto Express coprocessor directly**

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