z/OS V2.4 IBM Education Assistant (IEA)

Line Item : RMF Crypto Domain Support

Element/Component: RMF

Agenda

- Trademarks
- Session Objectives
- Overview
- Usage & Invocation
- Interactions & Dependencies
- Migration & Coexistence Considerations
- Installation
- Session Summary
- Appendix

Trademarks

- See URL http://www.ibm.com/legal/copytrade.shtml for a list of trademarks.

- Additional Trademarks:
  - None

Session Objectives

- Explain purpose/usage of RMF item Epic 206134 / FP1928

  - RMF online monitoring with Monitor III and Distributed Data Server (DDS)

    - Introducing new Monitor III Crypto Hardware Data Gatherer and reporter.

    - Introducing RMF DDS full report support for Monitor III Crypto Data.

    - Explain the different invocation steps, usage and importance of Crypto Reports.

Overview

- Problem Statement / Need Addressed:
  - To observe performance measurements of cryptographic hardware in real-time, not only after-the-facts analysis with SMF 70 subtype 2
  - Reporting crypto activity statistics and overall statistics for
    - Home partition and Sysplex respectively.

- Solution:
  - Introduced new RMF Monitor III sysplex reports
    - Detailed data for partitions (domain).
    - Aggregated data for CPCs hosting the Sysplex.

- Benefit / Value:
  - RMF online monitoring with Monitor III and Distributed Data Server:
    - Used to analyse performance of cryptographic hardware available to z/OS.

Usage & Invocation

Commands:

- Users can control whether they want Monitor III to collect crypto hardware activity data by specifying the data gathering option

    CRYPTO | NOCRYPTO

- Default value CRYPTO is set in shipped PARMLIB member ERBRMF04

```
/*******************************************************************/
/* NAME:          ERBRMF04                                         */
/*                                                                 */
/* DESCRIPTION: PARMLIB MEMBER WITH RMF MONITOR III GATHERER OPTIONS */
/*                (ALL OPTIONS ARE SET TO DEFAULTS)                 */
/*******************************************************************/
  CYCLE(1000)                   /* SAMPLE EVERY SECOND (1000 MSEC)    */
  DATASET(STOP)                 /* NO DATASET SUPPORT                 */
  DATASET(NOSWITCH)             /* APPEND TO LAST NON-FULL DATASET    */
  DATASET(WHOLD(128))           /* CONTROLS BUFFER PAGES IN STORAGE   */
  MINTIME(100)                  /* LENGTH OF MINTIME                  */
NOOPTIONS                       /* DO NOT DISPLAY OPTIONS             */
... ... ...
  SCM                           /* ACTIVATE SCM DATA GATHERING        */
  ZFS                           /* ACTIVATE ZFS DATA GATHERING        */
  CRYPTO                        /* ACTIVATE CRYPTO DATA GATHERING     */
NOSGSPACE                       /* NO STORAGE GROUP SPACE GATHERING   */
NOLOCK                          /* NO LOCK DATA GATHERING             */
```

Usage & Invocation

Commands:

- Three new Monitor III commands:

  - CRYOVW (Cryptographic Hardware Overview report) - CRO

  - CRYACC   (Cryptographic Accelerator Activity report) - CRA

  - CRYPKC   (Cryptographic PKCS11 Coprocessor Activity report) - CRP

- CRO, CRY and CRP do not have command parameters

Usage & Invocation

RMF Monitor III Crypto Sysplex Reports:

To request the Monitor III CRYOVW, CRYACC and CRYPKC reports

- Alternative A:

1. Select 'S' from the Primary Menu,

2. Then select option- 16, 17 or 18

   from the Sysplex Report Selection Menu.

- Alternative B:

  Enter one of these commands:

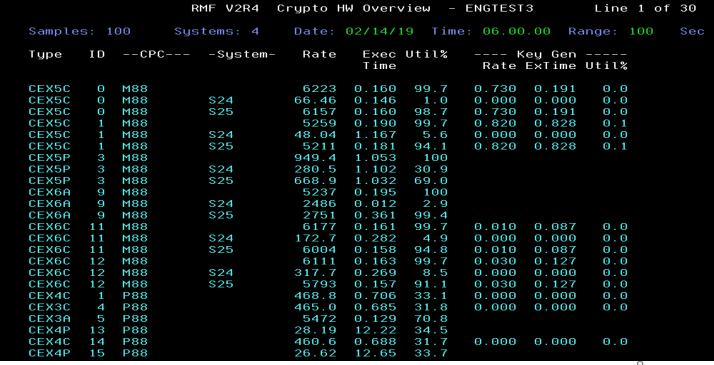 - CRYOVW or CRO,

  - CRYACC or CRA,

  - CRYPKC or CRP.

```
                    RMF Sysplex Report Selection Menu

Enter selection number or command for desired report.


Sysplex Reports
      1  SYSSUM    Sysplex performance summary                    (SUM)
      1A SYSRG     Resource Group activity                        (SRG)
      2  SYSRTD    Response time distribution                     (RTD)
      3  SYSWKM    Work Manager delays                            (WKM)
      4  SYSENQ    Sysplex-wide Enqueue delays                    (ES)
      5  CFOVER    Coupling Facility overview                     (CO)
      6  CFSYS     Coupling Facility systems                      (CS)
      7  CFACT     Coupling Facility activity                     (CA)
      8  CACHSUM   Cache summary                                  (CAS)
      9  CACHDET   Cache detail                                   (CAD)
     10  RLSSC     VSAM RLS activity by storage class             (RLS)
     11  RLSDS     VSAM RLS activity by data set                  (RLD)
     12  RLSLRU    VSAM LRU overview                              (RLL)
     13  ZFSOVW    zFS Overview                                   (ZFO)
     14  ZFSFS     zFS File System                                (ZFF)
     15  ZFSKN     zFS Kernel                                     (ZFK)
     16  CRYOVW    Crypto hardware overview                       (CRO)
     17  CRYACC    Crypto accelerator activity                    (CRA)
     18  CRYPKC    Crypto PKCS11 coprocessor activity             (CRP)

Data Index
      D  DSINDEX   Data index                                     (DI)
```

Usage & Invocation

1. RMF Monitor III CRYOVW Report:

This report can be used:

- To investigate performance problems related to usage of various cryptographic hardware functions in the system.
- The report provides information about cryptographic hardware configured in
  - Accelerator
  - CCA coprocessor or
  - PKCS11 coprocessor mode.
- For each Crypto Adapter card in Sysplex, the CRYOVW provides measurements at
  - CPC and
  - LPAR level

  (usage domain level)

```
                        RMF V2R4   Crypto HW Overview   - ENGTEST3        Line 1 of 30

    Samples: 100        Systems: 4      Date: 02/14/19  Time: 06.00.00   Range: 100    Sec

    Type     ID   --CPC---   -System-    Rate    Exec Util%    ---- Key Gen -----
                                                 Time          Rate ExTime Util%

    CEX5C    0    M88                    6223    0.160  99.7    0.730  0.191    0.0
    CEX5C    0    M88        S24         66.46   0.146   1.0    0.000  0.000    0.0
    CEX5C    0    M88        S25         6157    0.160  98.7    0.730  0.191    0.0
    CEX5C    1    M88                    5259    0.190  99.7    0.820  0.828    0.1
    CEX5C    1    M88        S24         48.04   1.167   5.6    0.000  0.000    0.0
    CEX5C    1    M88        S25         5211    0.181  94.1    0.820  0.828    0.1
    CEX5P    3    M88                    949.4   1.053   100
    CEX5P    3    M88        S24         280.5   1.102  30.9
    CEX5P    3    M88        S25         668.9   1.032  69.0
    CEX6A    9    M88                    5237    0.195   100
    CEX6A    9    M88        S24         2486    0.012   2.9
    CEX6A    9    M88        S25         2751    0.361  99.4
    CEX6C    11   M88                    6177    0.161  99.7    0.010  0.087    0.0
    CEX6C    11   M88        S24         172.7   0.282   4.9    0.000  0.000    0.0
    CEX6C    11   M88        S25         6004    0.158  94.8    0.010  0.087    0.0
    CEX6C    12   M88                    6111    0.163  99.7    0.030  0.127    0.0
    CEX6C    12   M88        S24         317.7   0.269   8.5    0.000  0.000    0.0
    CEX6C    12   M88        S25         5793    0.157  91.1    0.030  0.127    0.0
    CEX4C    1    P88                    468.8   0.706  33.1    0.000  0.000    0.0
    CEX3C    4    P88                    465.0   0.685  31.8    0.000  0.000    0.0
    CEX3A    5    P88                    5472    0.129  70.8
    CEX4P    13   P88                    28.19  12.22   34.5
    CEX4C    14   P88                    460.6   0.688  31.7    0.000  0.000    0.0
    CEX4P    15   P88                    26.62  12.65   33.7
```

Usage & Invocation

RMF Monitor III CRYOVW Report- Fields

Field Heading	Meaning
Type	Type that defines the cryptographic hardware function: **Type** **Meaning** CEX3A Crypto Express3 Accelerator. CEX4A Crypto Express4S Accelerator. CEX5A Crypto Express5S Accelerator. CEX6A Crypto Express6S Accelerator. CEX3C Crypto Express3 Coprocessor. CEX4C Crypto Express4S Coprocessor. CEX5C Crypto Express5S Coprocessor. CEX6C Crypto Express6S Coprocessor. CEX4P Crypto Express4S PKCS11 Coprocessor. CEX5P Crypto Express5S PKCS11 Coprocessor. CEX6P Crypto Express6S PKCS11 Coprocessor.
ID	Index that specifies the cryptographic hardware function.
CPC	Name of the CPC which used the cryptographic hardware function with the respective ID.
Sys	Name of the partition which used the cryptographic hardware function with the respective ID.
Rate	Rate of all operations on this cryptographic hardware function.
Exec Time	Average execution time (in milliseconds) of all operations on this cryptographic hardware function.
Util%	Total utilization percentage of this cryptographic hardware function.

Usage & Invocation

2. RMF Monitor III CRYACC Report

This report can be used:

- To investigate performance problems related to usage of cryptographic hardware configured in Accelerator mode.

- For each Crypto Accelerator card in Sysplex, the report provides measurements about public key operations (RSA cryptography operations), both at CPC and LPAR level.

```
                 RMF V2R4   Crypto Acc Activity - ENGTEST3        Line 1 of 15

Samples: 100       Systems: 4      Date: 02/14/19  Time: 06.00.00   Range: 100    Sec

Type    ID  --CPC---   -System-   -Key   ----- ME RSA -----   ---- CRT RSA -----
                                  Len    Rate ExTime Util%     Rate ExTime Util%

CEX6A    9  M88                   1024   2705  0.023    6.1    64.25  0.078    0.5
CEX6A    9  M88                   2048  223.7  0.040    0.9    274.6  0.334    9.2
CEX6A    9  M88                   4096  661.6  0.122    8.0     1308  0.593   77.6
CEX6A    9  M88        S24        1024   2486  0.012    2.9    0.000  0.000    0.0
CEX6A    9  M88        S24        2048  0.000  0.000    0.0    0.000  0.000    0.0
CEX6A    9  M88        S24        4096  0.000  0.000    0.0    0.000  0.000    0.0
CEX6A    9  M88        S25        1024  218.5  0.147    3.2    64.25  0.078    0.5
CEX6A    9  M88        S25        2048  223.7  0.040    0.9    274.6  0.334    9.2
CEX6A    9  M88        S25        4096  661.6  0.122    8.0     1308  0.593   77.6
CEX3A    5  P88                   1024  0.000  0.000    0.0     5472  0.129   70.8
CEX3A    5  P88                   2048  0.000  0.000    0.0    0.000  0.000    0.0
CEX3A    5  P88                   4096  0.000  0.000    0.0    0.000  0.000    0.0
CEX5A    9  S89                   1024  0.000  0.000    0.0    0.000  0.000    0.0
CEX5A    9  S89                   2048  0.000  0.000    0.0    147.8  0.522    7.7
CEX5A    9  S89                   4096  0.000  0.000    0.0    673.0  1.371   92.2
```

Usage & Invocation

RMF Monitor III CRYACC Report- Fields

Field Heading	Meaning
Type	Type that defines the cryptographic accelerator: **Type**　　　　**Meaning** **CEX3A**　　Crypto Express3 Accelerator. **CEX4A**　　Crypto Express4S Accelerator. **CEX5A**　　Crypto Express5S Accelerator. **CEX6A**　　Crypto Express6S Accelerator.
ID	Index that specifies the cryptographic hardware function.
CPC	Name of the CPC which used the cryptographic hardware function with the respective ID.
Sys	Name of the partition which used the cryptographic hardware function with the respective ID.
Key Len	RSA key length for each cryptographic accelerator and for each available RSA operation format (ME or CRT).
ME RSA	Rate, average execution time (in milliseconds) and utilization percentage of all operations in ME-format (one line for each used RSA key length).
CRT RSA	Rate, average execution time (in milliseconds) and utilization percentage of all operations in CRT-format (one line for each used RSA key length).

Usage & Invocation

3. RMF Monitor III CRYPKC Report:

This report can be used:

- To investigate performance problems related to usage of cryptographic hardware configured in PKCS11 coprocessor mode.

- For each Crypto PKCS11 card in Sysplex, the report provides measurements about secure public-key operations executed by cryptographic symmetric- and asymmetric-key functions (PKCS11 cryptography)
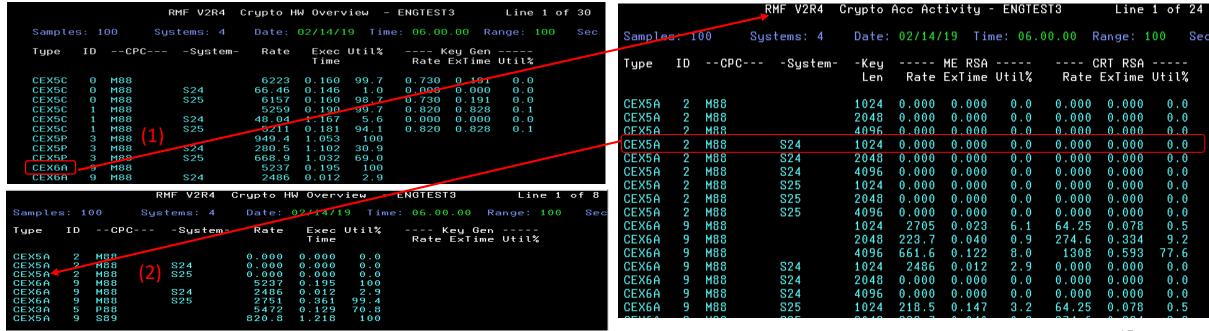 - Both at the CPC and LPAR (usage domain) level.

```
                    RMF V2R4   Crypto PKCS11 Act.   - ENGTEST3              Line 1 of 7

Samples: 100        Systems: 4      Date: 02/14/19  Time: 06.00.00  Range: 100     Sec

Type    ID  --CPC--- -System-  -Asym Slow   -Asym Fast   -Symm Part   -Symm Cmpl
                               Rate Utl%    Rate Utl%    Rate Utl%    Rate Utl%

CEX5P    3  M88                533.7 52.6   399.1 46.6   0.000  0.0   16.07  0.7
CEX5P    3  M88       S24      231.4 21.4   40.57  9.2   0.000  0.0   8.450  0.4
CEX5P    3  M88       S25      302.3 31.2   358.5 37.4   0.000  0.0   7.620  0.3
CEX4P   13  P88                13.97  3.3   0.000  0.0   0.000  0.0   14.14 31.1
CEX4P   15  P88                13.07  3.8   0.000  0.0   0.000  0.0   12.90 29.3
CEX5P    4  S89                341.6 34.3   484.8 42.0   0.000  0.0   0.000  0.0
CEX5P    5  S89                341.8 34.3   485.3 41.7   0.000  0.0   0.000  0.0
```

Usage & Invocation

RMF Monitor III CRYPKC Report- Fields

Field Heading	Meaning
Type	Type that defines the cryptographic PKCS11 coprocessor: **Type** **Meaning** **CEX4P** Crypto Express4S PKCS11 Coprocessor. **CEX5P** Crypto Express5S PKCS11 Coprocessor. **CEX6P** Crypto Express6S PKCS11 Coprocessor.
ID	Index that specifies the cryptographic hardware function.
CPC	Name of the CPC which used the cryptographic hardware function with the respective ID.
Sys	Name of the partition which used the cryptographic hardware function with the respective ID.
Rate Util%	Rate and utilization percentage of executed PKCS11 operations, categorized by cryptographic function type: **Type** **Meaning** **Asym Slow** Slow asymmetric-key function. **Asym Fast** Fast asymmetric-key function. **Symm Part** Symmetric-key function that returns partial or incremental results. **Symm Cmpl** Symmetric-key function that returns a complete or final result. **Asym Gen** Asymmetric-key generation function.

Usage & Invocation

RMF Monitor III Cursor Sensitivity

- CRYOVW: Cursor sensitivity on ACC or PKC line displays CRYACC or CRYPKC (refer (1)).

- CRYACC, CRYPKC: Cursor sensitivity links back to CRYOVW, showing only ACC or PKC data lines (refer (2)).

- All reports: Cursor sensitivity on sysplex name or systems field in the header links to the DI (Data Index) screen.
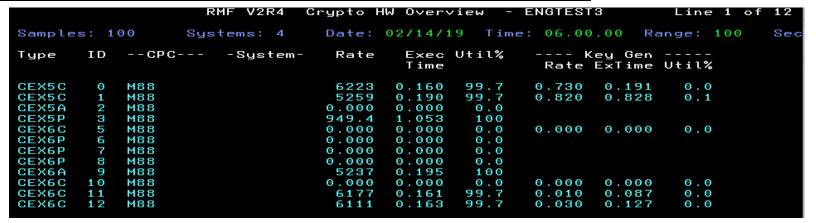
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Usage & Invocation

RMF Monitor III Crypto Report Options

- The contents of the Monitor III Crypto reports can be tailored by report options:
  - Invoke with RO *(Report Options)* command on CRYOVW/CRYACC/CRYPKC panel)

Example: Showing only lines for CPC „M88", include inactive lines.

```
                         RMF  Crypto  Report  Options              Line 1 of 1

Change  or  verify  parameters.  To  exit  press  END.
Changes  will  apply  to  the  CRYOVW,  CRYACC  and  CRYPKC  reports.

Scope      ===>  M88            ALL  or  one  of  the  available  CPC  or  system  names  below
Function  ===>  ALL            Show  ALL  crypto  functionalities,
                                only  accelerator  (ACC),  CCA  (CCA)  or  PKCS11  (PKC)
                                coprocessor  data  in  CRYOVW  report
Inactive ===>  YES            Show  inactive  cryptographic  card  entries  (YES  or  NO)


                         Available  CPCs  and  Systems
M88            P88            S0D            S0F            S24            S25            S89
```

```
                         RMF  V2R4    Crypto  HW  Overview    -  ENGTEST3              Line 1 of 12
Samples:  100          Systems:  4        Date:  02/14/19    Time:  06.00.00    Range:  100      Sec

Type      ID    --CPC---    -System-      Rate      Exec  Util%      ---- Key Gen -----
                                                    Time              Rate ExTime  Util%

CEX5C      0    M88                        6223     0.160   99.7      0.730   0.191    0.0
CEX5C      1    M88                        5259     0.190   99.7      0.820   0.828    0.1
CEX5A      2    M88                        0.000    0.000    0.0
CEX5P      3    M88                        949.4    1.053   100
CEX6C      5    M88                        0.000    0.000    0.0      0.000   0.000    0.0
CEX6P      6    M88                        0.000    0.000    0.0
CEX6P      7    M88                        0.000    0.000    0.0
CEX6P      8    M88                        0.000    0.000    0.0
CEX6A      9    M88                        5237     0.195   100
CEX6C     10    M88                        0.000    0.000    0.0      0.000   0.000    0.0
CEX6C     11    M88                        6177     0.161   99.7      0.010   0.087    0.0
CEX6C     12    M88                        6111     0.163   99.7      0.030   0.127    0.0
```

Usage & Invocation

RMF Monitor III Crypto Report Options

- Example:
  Restrict CRYOVW to accelerator functionality (ACC), show only active lines

```
                    RMF  Crypto  Report  Options                    Line 1 of 1

Change or verify parameters. To exit press END.
Changes will apply to the CRYOVW, CRYACC and CRYPKC reports.

Scope      ===>  ALL        ALL or one of the available CPC or system names below
Function   ===>  ACC        Show ALL crypto functionalities,
                            only accelerator (ACC), CCA (CCA) or PKCS11 (PKC)
                            coprocessor data in CRYOVW report
Inactive ===>  NO           Show inactive cryptographic card entries (YES or NO)


                        Available CPCs and Systems
M88          P88         S0D         S0F         S24         S25         S89
```

```
                    RMF V2R4   Crypto HW Overview   - ENGTEST3        Line 1 of 5

Samples: 100        Systems: 4     Date: 02/14/19  Time: 06.00.00  Range: 100    Sec

Type     ID   --CPC---   -System-    Rate     Exec Util%      ---- Key Gen -----
                                              Time             Rate ExTime Util%

CEX6A    9    M88                    5237     0.195    100
CEX6A    9    M88        S24         2486     0.012    2.9
CEX6A    9    M88        S25         2751     0.361    99.4
CEX3A    5    P88                    5472     0.129    70.8
CEX5A    9    S89                    820.8    1.218    100
```

Usage & Invocation

RMF DDS Full Report Support

- The browser based version of CRYOVW can be requested from RMF Distributed Data Server (DDS) using the following URL:
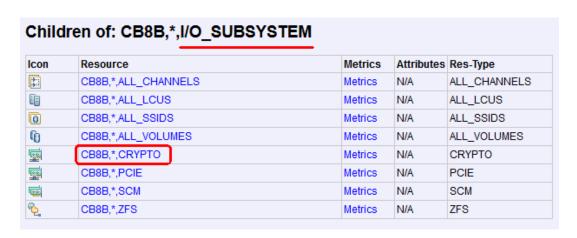 **http://hostname:8803/gpm/rmfm3.xml?report=CRYOVW&resource=,SYSDPLEX,SYSPLEX**

Also includes ACC and PKC data!

RMF Report [,UTCPLXCB,SYSPLEX] : CRYOVW (Crypto Hardware Overview)

Time Range: 12/19/2018 08:57:00 - 12/19/2018 08:58:00

Crypto Card Type	Crypto Card Index	CPC Name	System Name	Usage Domain ID	Scope	Cryptographic Mode	Total Rate	Total Avg Exec Time	Total Util %	RSA-Key-Gen Rate	RSA-Key-Gen Avg Exec Time	RSA-Key-Gen Util %	RSA Key Length	ME-Format RSA Rate	ME-Format RSA Avg Exec Time	ME-Format RSA Util %	CRT-Format RSA Rate	CRT-Format RSA Avg Exec Time	CRT-Format RSA Util %
CEX6C	0	M113			C	C	0.000	0.000	0.0	0.000	0.000	0.0							
CEX6C	0	M114			C	C	0.000	0.000	0.0	0.000	0.000	0.0							
CEX6A	0	M92			C	A	5.000	0.127	0.1				1024	1.667	0.018	0.0	1.500	0.133	0.0
CEX6A	0	M92			C	A							2048	1.233	0.031	0.0	0.600	0.610	0.0
CEX6A	0	M92			C	A							4096	0.000	0.000	0.0	0.000	0.000	0.0
CEX5C	0	S310			C	C	0.000	0.000	0.0	0.000	0.000	0.0							
CEX6C	1	M113			C	C	0.000	0.000	0.0	0.000	0.000	0.0							
CEX6C	1	M114			C	C	0.000	0.000	0.0	0.000	0.000	0.0							
CEX6A	1	M92			C	A	5.000	0.221	0.1				1024	1.333	0.019	0.0	1.500	0.133	0.0
CEX6A	1	M92			C	A							2048	0.767	0.034	0.0	1.400	0.608	0.1
CEX6A	1	M92			C	A							4096	0.000	0.000	0.0	0.000	0.000	0.0
CEX5A	1	S310			C	A	9.667	0.181	0.2				1024	2.900	0.026	0.0	2.900	0.139	0.0
CEX5A	1	S310			C	A							2048	1.933	0.039	0.0	1.933	0.618	0.1
CEX5A	1	S310			C	A							4096	0.000	0.000	0.0	0.000	0.000	0.0
CEX6C	2	M92			C	C	0.033	0.714	0.0	0.000	0.000	0.0							
CEX5C	2	S310			C	C	0.000	0.000	0.0	0.000	0.000	0.0							
CEX6C	2	M92	CB8A	17	S	C	0.033	0.714	0.0	0.000	0.000	0.0							
CEX6C	2	M92	CB8C	13	S	C	0.000	0.000	0.0	0.000	0.000	0.0							
CEX6C	3	M92			C	C	0.033	0.706	0.0	0.000	0.000	0.0							
CEX6C	3	M92	CB8A	17	S	C	0.033	0.706	0.0	0.000	0.000	0.0							
CEX6C	3	M92	CB8C	13	S	C	0.000	0.000	0.0	0.000	0.000	0.0							

Slow Asym-Key Rate	Slow Asym-Key Avg Exec Time	Slow Asym-Key Util %	Fast Asym-Key Rate	Fast Asym-Key Avg Exec Time	Fast Asym-Key Util %

Sym-Key Partial Rate	Sym-Key Partial Avg Exec Time	Sym-Key Partial Util %	Sym-Key Final Rate	Sym-Key Final Avg Exec Time	Sym-Key Final Util %

Asym-Key Generation Rate	Asym-Key Generation Avg Exec Time	Asym-Key Generation Util %	SMF ID
			CB86
			CB8B
			CB8A
			CB8A
			CB8A

Usage & Invocation

RMF DDS Crypto Resources

- New CRYPTO and CRYPTO_CARD resource types are added to the I/O_SUBSYSTEM resource:

Children of: CB8B,*,I/O_SUBSYSTEM

Icon	Resource	Metrics	Attributes	Res-Type
	CB8B,*,ALL_CHANNELS	Metrics	N/A	ALL_CHANNELS
	CB8B,*,ALL_LCUS	Metrics	N/A	ALL_LCUS
	CB8B,*,ALL_SSIDS	Metrics	N/A	ALL_SSIDS
	CB8B,*,ALL_VOLUMES	Metrics	N/A	ALL_VOLUMES
	CB8B,*,CRYPTO	Metrics	N/A	CRYPTO
	CB8B,*,PCIE	Metrics	N/A	PCIE
	CB8B,*,SCM	Metrics	N/A	SCM
	CB8B,*,ZFS	Metrics	N/A	ZFS

Children of: CB8B,*,CRYPTO

Icon	Resource	Metrics	Attributes	Res-Type
	CB8B,0,CRYPTO_CARD	Metrics	Show	CRYPTO_CARD
	CB8B,1,CRYPTO_CARD	Metrics	Show	CRYPTO_CARD
	CB8B,10,CRYPTO_CARD	Metrics	Show	CRYPTO_CARD
	CB8B,11,CRYPTO_CARD	Metrics	Show	CRYPTO_CARD
	CB8B,2,CRYPTO_CARD	Metrics	Show	CRYPTO_CARD
	CB8B,3,CRYPTO_CARD	Metrics	Show	CRYPTO_CARD
	CB8B,4,CRYPTO_CARD	Metrics	Show	CRYPTO_CARD
	CB8B,6,CRYPTO_CARD	Metrics	Show	CRYPTO_CARD
	CB8B,7,CRYPTO_CARD	Metrics	Show	CRYPTO_CARD
	CB8B,8,CRYPTO_CARD	Metrics	Show	CRYPTO_CARD
	CB8B,9,CRYPTO_CARD	Metrics	Show	CRYPTO_CARD

- Details are available for the CRYPTO_CARD resource:

Attributes of: CB8B,1,CRYPTO_CARD

Description	Value
Card type	CEX6C
Card ID	1
CPC name	M113
Usage domain	

Usage & Invocation

RMF DDS Crypto Metrics

- All performance metrics from the Crypto Sysplex reports are added to the crypto resources in the DDS and are promoted to the SYSPLEX and CPC resource as well.

Available metrics for: TRX1,1,CRYPTO_CARD

Metric description	Help	Id
% utilization asym-key generation operations (domain)	Explanation	8D6460
% utilization asym-key generation operations (CPC)	Explanation	8D6480
% utilization complete sym-key operations (domain)	Explanation	8D64A0
% utilization complete sym-key operations (CPC)	Explanation	8D64C0
% utilization crypto operations (domain)	Explanation	8D64E0
% utilization crypto operations (CPC)	Explanation	8D6500
% utilization fast asym-key operations (domain)	Explanation	8D6520

Available metrics for: ,TRX1PLEX,SYSPLEX

by crypto card		
% utilization asym-key generation operations (domain) by crypto card	Explanation	8D6470
% utilization asym-key generation operations (CPC) by crypto card	Explanation	8D6490
% utilization complete sym-key operations (domain) by crypto card	Explanation	8D64B0
% utilization complete sym-key operations (CPC) by crypto card	Explanation	8D64D0
% utilization crypto operations (domain) by crypto card	Explanation	8D64F0
% utilization crypto operations (CPC) by crypto card	Explanation	8D6510
% utilization fast asym-key operations (domain) by crypto card	Explanation	8D6530

Available metrics for: TRX1,*,CRYPTO

Metric description	Help	Id
by crypto card		
% utilization asym-key generation operations (domain) by crypto card	Explanation	8D6470
% utilization asym-key generation operations (CPC) by crypto card	Explanation	8D6490
% utilization complete sym-key operations (domain) by crypto card	Explanation	8D64B0
% utilization complete sym-key operations (CPC) by crypto card	Explanation	8D64D0
% utilization crypto operations (domain) by crypto card	Explanation	8D64F0
% utilization crypto operations (CPC) by crypto card	Explanation	8D6510
% utilization fast asym-key operations (domain) by crypto card	Explanation	8D6530

Available metrics for: ,829E7,CPC

by crypto card		
% utilization asym-key generation operations (CPC) by crypto card	Explanation	8D6490
% utilization complete sym-key operations (CPC) by crypto card	Explanation	8D64D0
% utilization crypto operations (CPC) by crypto card	Explanation	8D6510
% utilization fast asym-key operations (CPC) by crypto card	Explanation	8D6550

Interactions & Dependencies

- Software Dependencies
    - None.

- Hardware Dependencies
    - Z14 GA2 level for crypto performance statistics with domain scope.

- Exploiters
    - None.

Migration & Coexistence Considerations

- None.

Installation

- This support is included in the GA shipment of the z/OS V2.4 RMF (HRM77C0) deliverable.

Session Summary

- Introduced new Monitor III crypto hardware data gatherer and reporter.

- Introduced new Monitor III gatherer option CRYPTO / NOCRYPTO to enable or disable crypto data gathering.

- Included new report options to tailor the Monitor III crypto reports.

- Introduced new resources CRYPTO and CRYPTO_CARD into the Distributed Data Server.

- Provided performance metrics for crypto hardware at the SYSPLEX, CPC, CRYPTO and CRYPTO_CARD resource level.

Appendix

- RMF - https://github.com/IBM/IBM-Z-zOS/tree/master/zOS-RMF
  - Contains Product information, presentations, etc.

- RMF email address: rmf@de.ibm.com

- Documentation and news
  - RMF Report Analysis, SC34-2665
  - RMF User's Guide, SC34-2664
  - RMF Programmer's Guide, SC34-2667
  - Latest version of PDF files can be downloaded from: http://www.ibm.com/systems/z/os/zos/bkserv/

Thank you