Performance Analysis of Long Distance CF, PPRC, and I/O: Test Project User Experience
17920

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#SHAREorg

Performance Analysis of Long Distance CF, PPRC, and I/O

Who Is İŞBANK ?

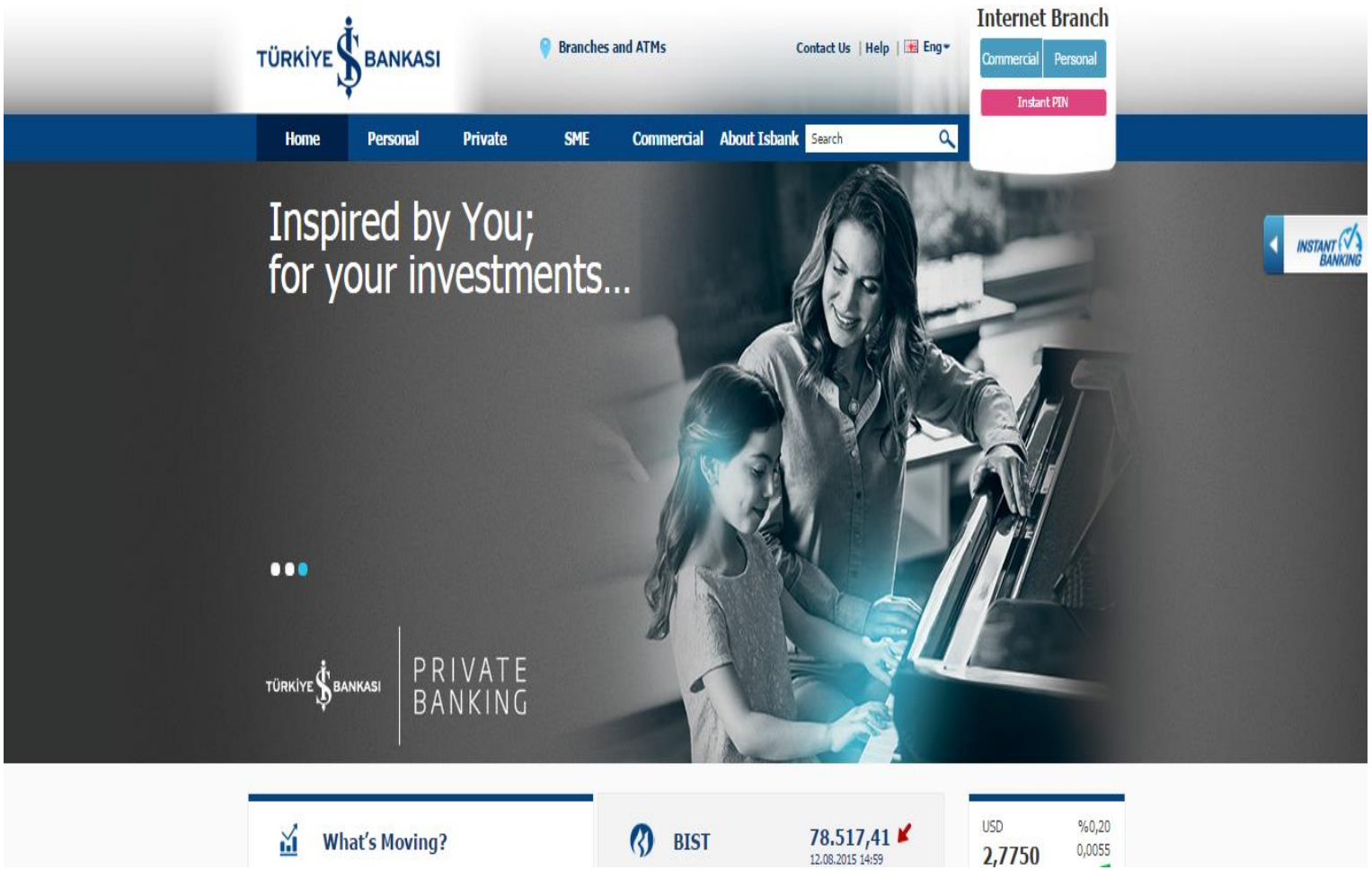
- The Biggest Bank Of Turkey
- 6366 ATMs
- 1344 Branches In Turkey, 25 Branches Outside Turkey
- In The List Of Top 100 Largest Bank - `The Banker` 2015 Report
- Member Of SHARE Inc.

Who Is İŞBANK ?

BRANCHES

Who Is İŞBANK ?

INTERNET BANKING



Who Is İŞBANK ?

ATM

İŞCEP
Mobile Phone Application

İŞBANK IPAD FINANCE CENTER
Application

Who Is İŞBANK ?

Credit Cards

Mainframe Configuration

2827-709 (3 ICF,3 zIIP,1 IFL)

SYSA
SYSY
TESE
TESG
USTX

z/OS V1R13
IMS V13
DB2 V10
MQ

BROCADE
FICON DIRECTOR8

PRODCFA
TESTCFA
USTACFA

324 GB Memory

2827-709 (3 ICF,3 zIIP)

SYSB
SYSZ
TESD
TESF
USTY

PRODCFB
TESTCFB
USTACFB

324 GB Memory

TEST-DS8800

PPRC
PRIM

PPRC
SEC

PROD-DS8870
PPRC -PRIMARY

PROD-DS8870
PPRC -SEC

GDPS/XRC - PRIMARY

IBM TS7740 -3 SIDE GRID

VTS0

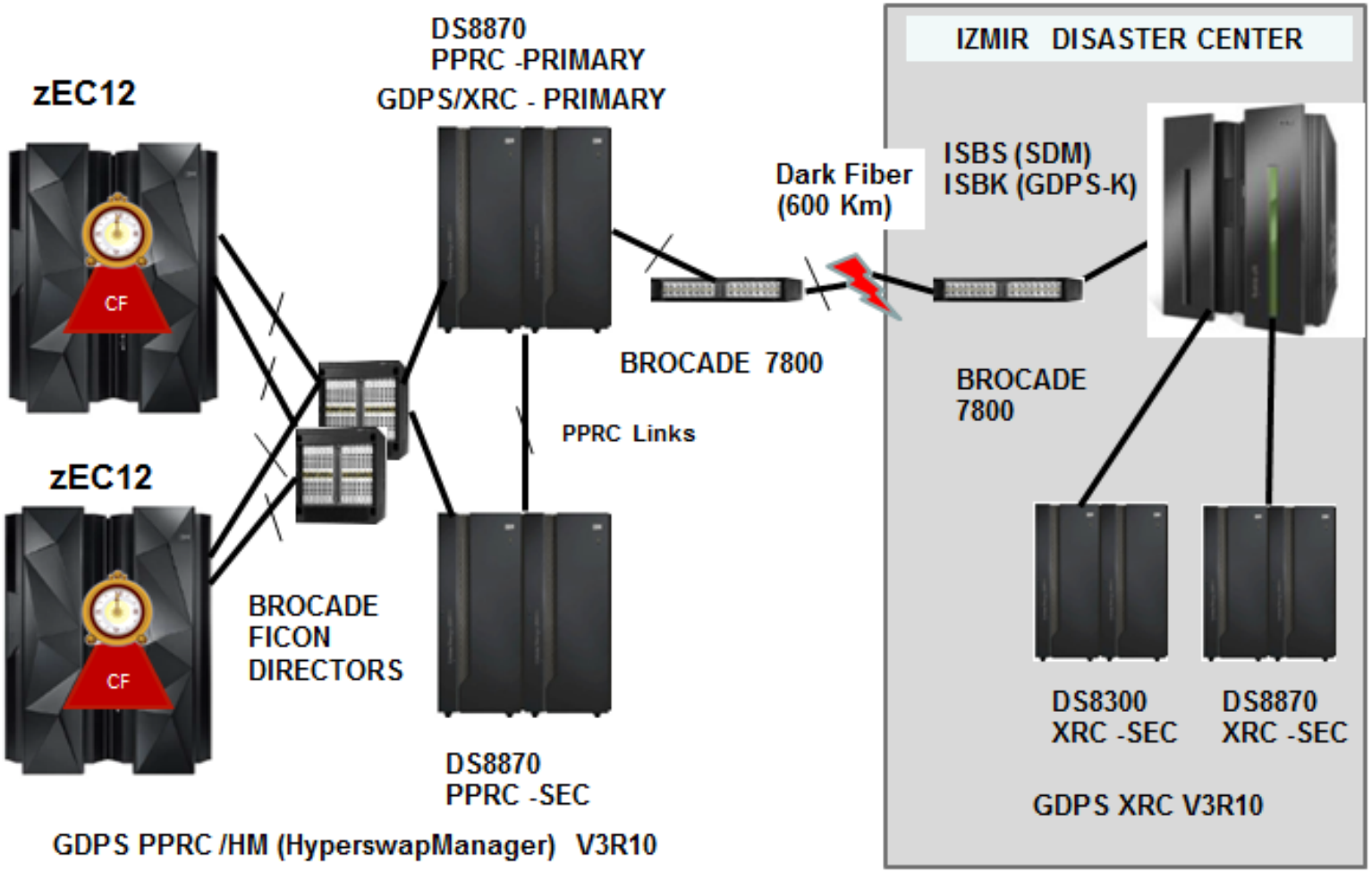
VTS1

IBM TS3500 ROBOT

IBM TS3500 ROBOT

IZMIR DISASTER CENTER (600 Km Away From Istanbul)

Current HW Configuration



Stretching out two CECs

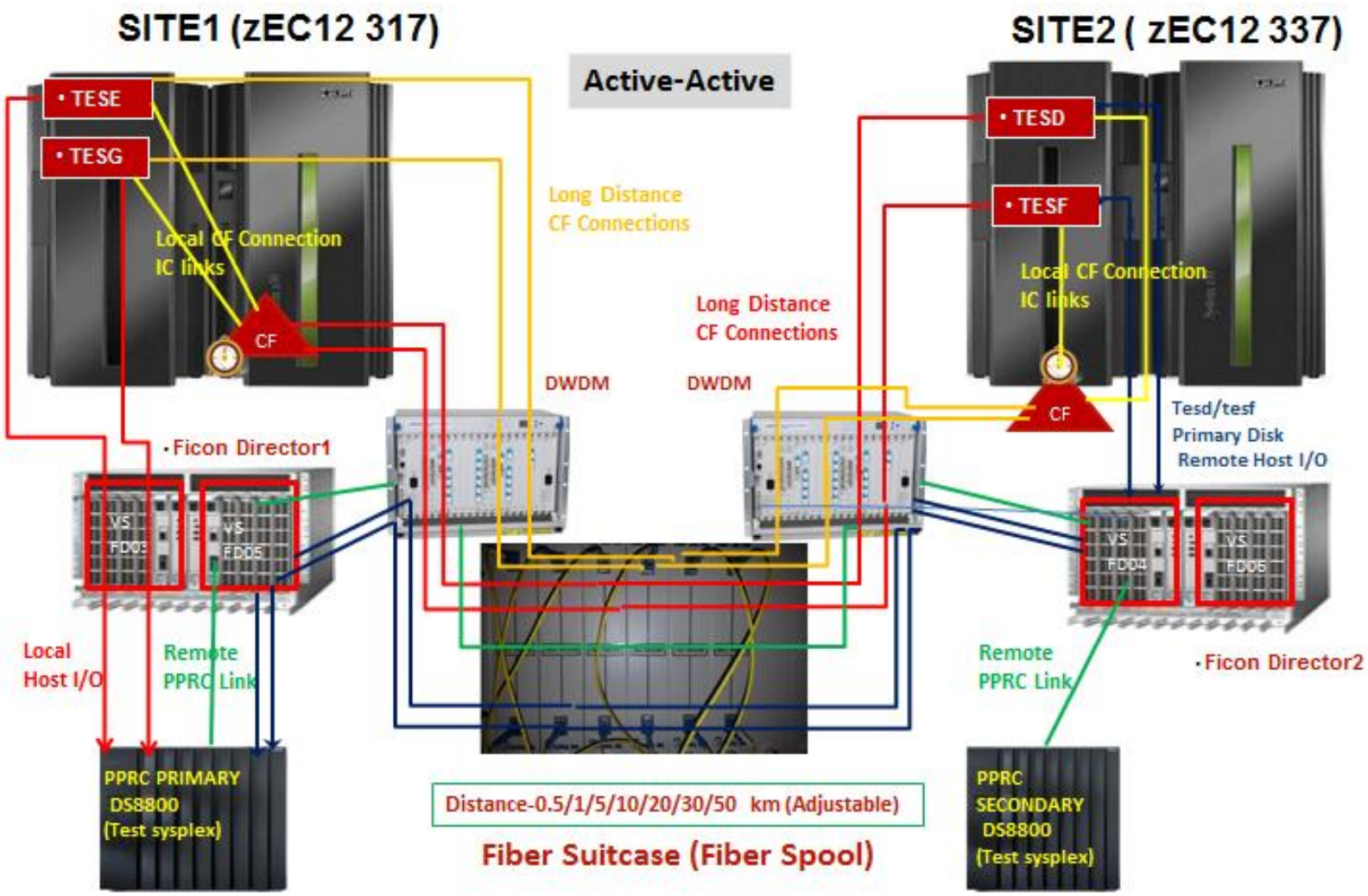
A Piece Of Cake ?

Datacenter I

Datacenter II

Not That Easy.But We DID!.

Target Configuration

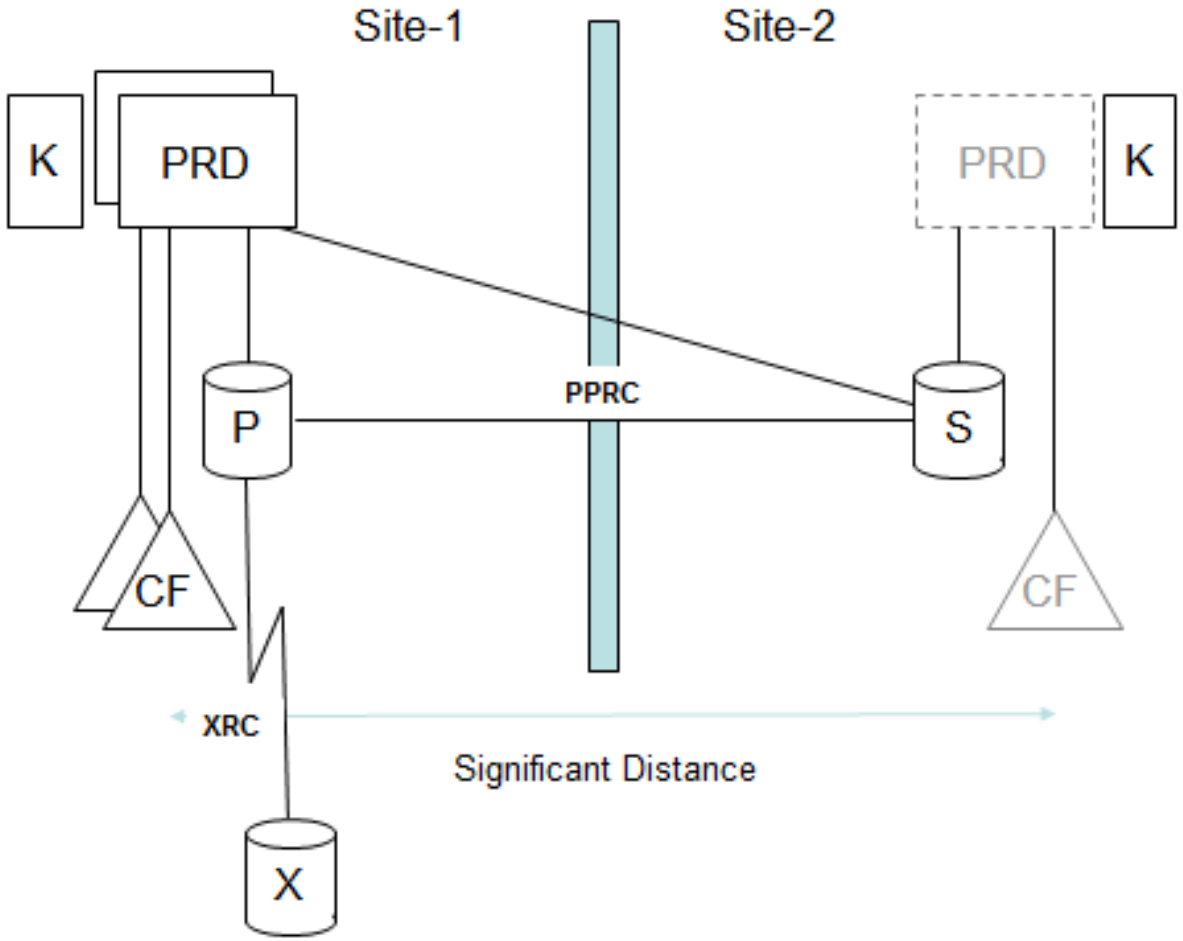


Two Data Centers Mainframe Options

- Active – Active
- Active – Standby
- Active – Hot Standby
- Active – Active (SW Solution)

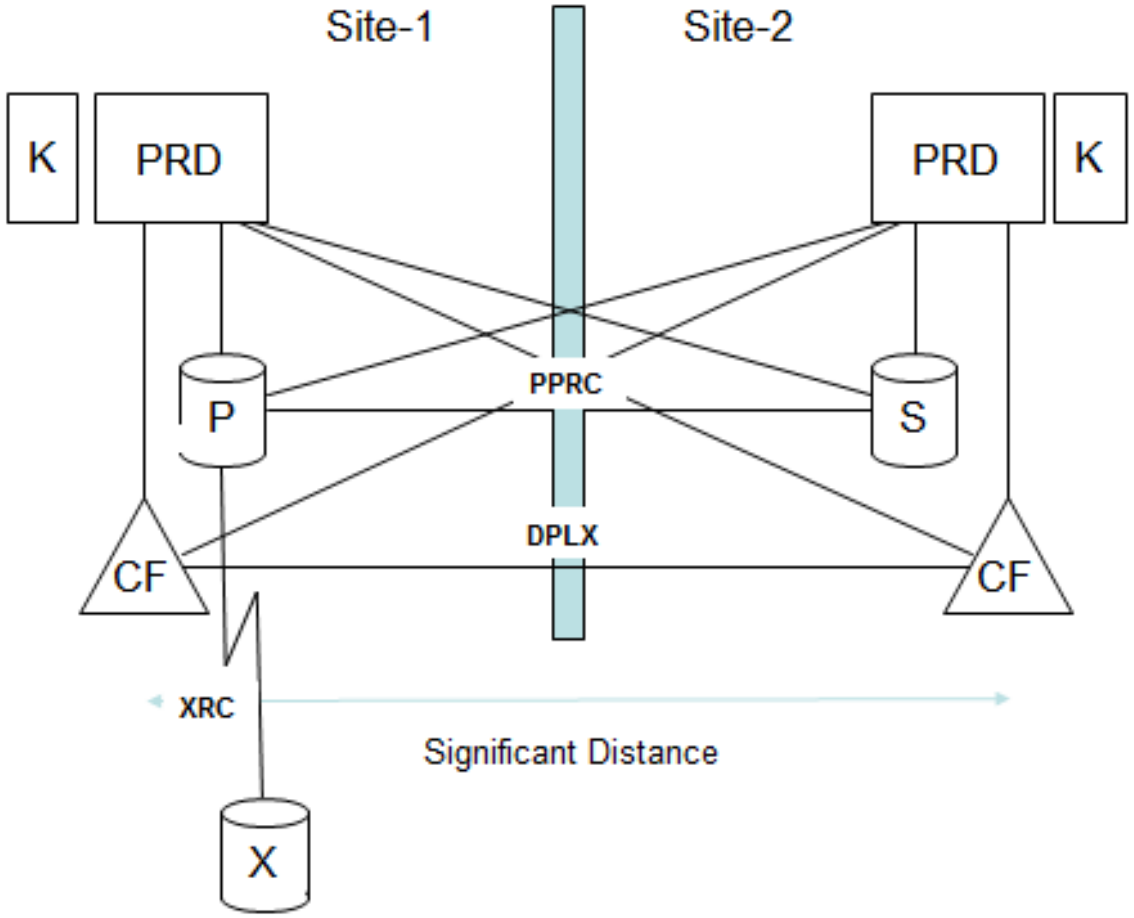
Two Data Centers Mainframe Options

- Active – Standby



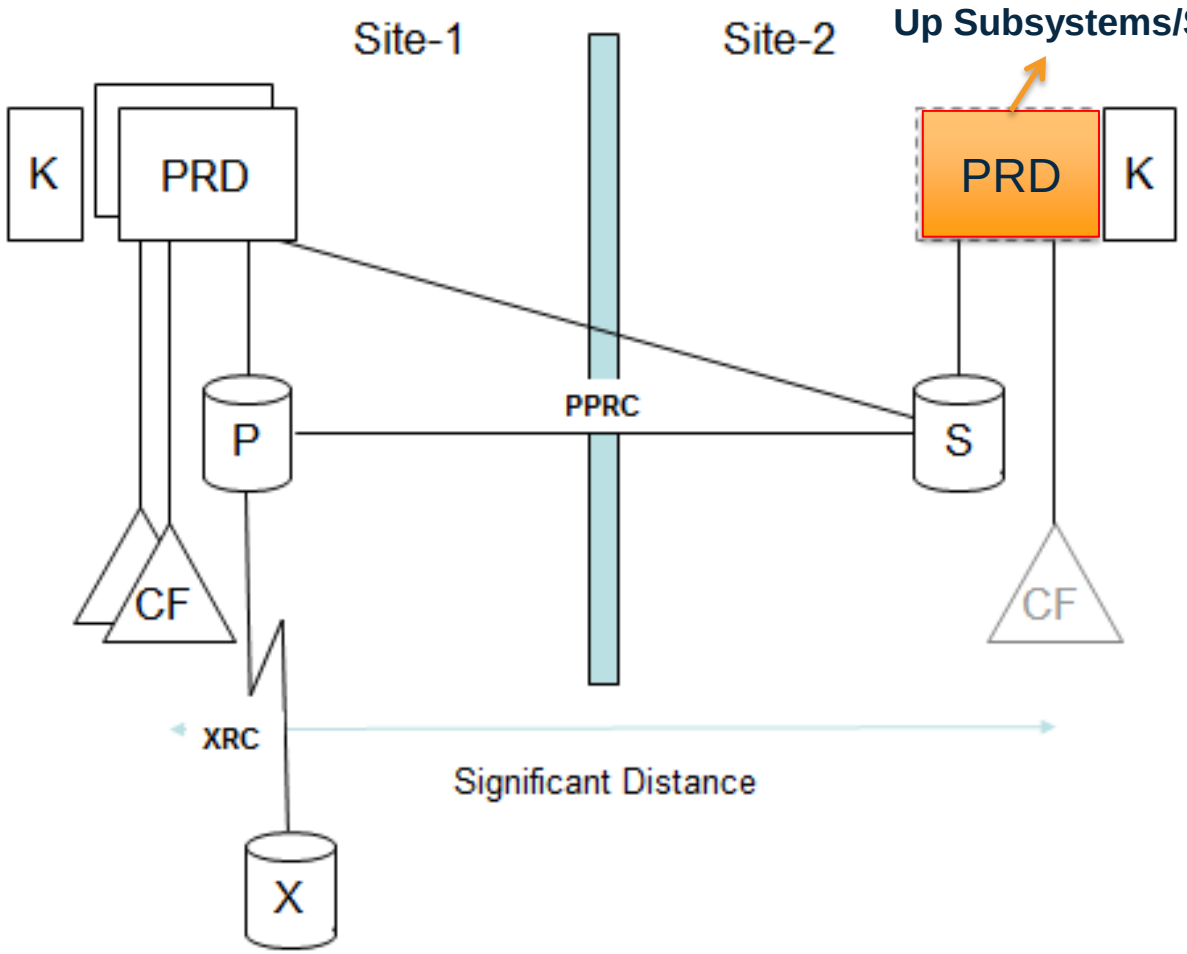
Two Data Centers Mainframe Options

- Active – Active (AKA GDPS/PPRC MultiSite Workload)



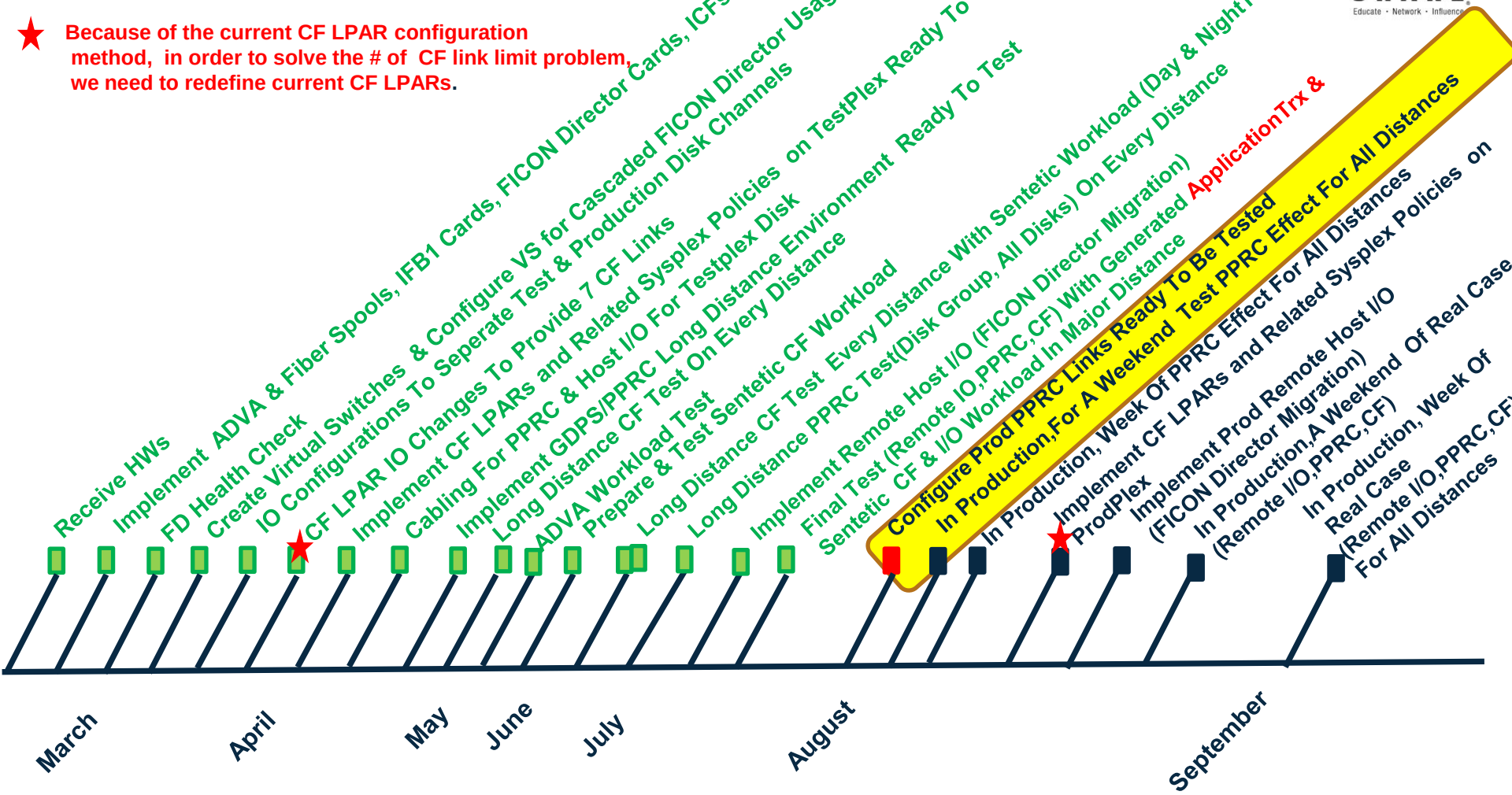
Two Data Centers Mainframe Options

- Active – Hot Standby



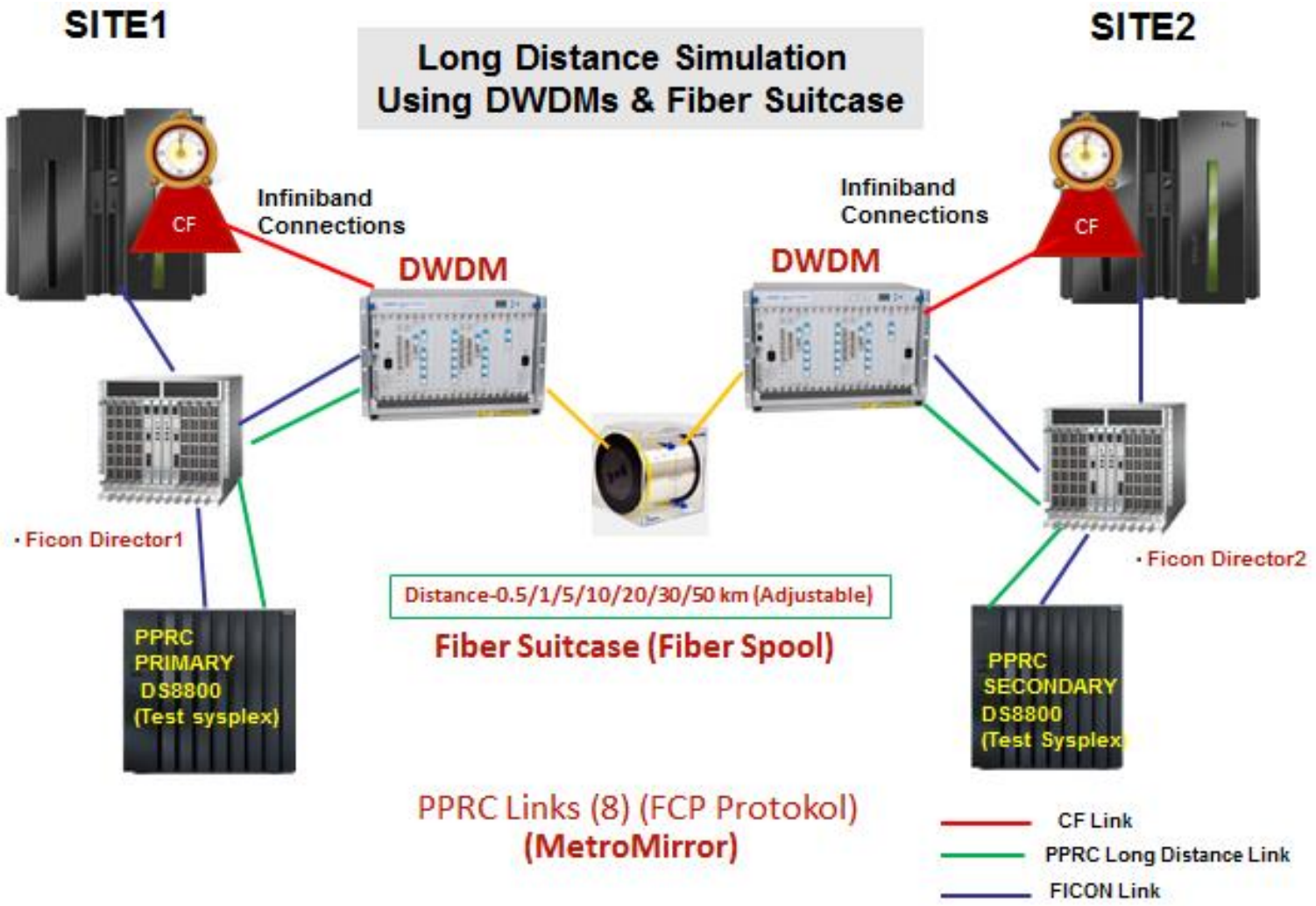
Project Plan - Steps – Status

★ **Because of the current CF LPAR configuration method, in order to solve the # of CF link limit problem, we need to redefine current CF LPARs.**

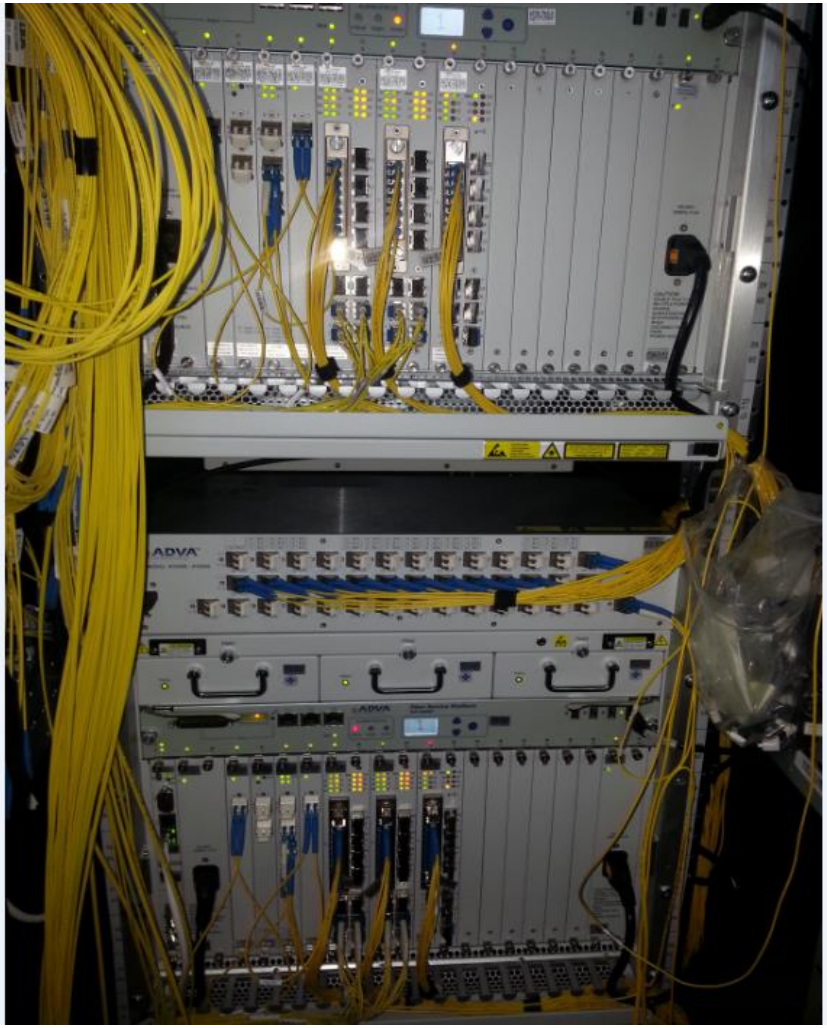


- **Week Of Test** : Every day one distance & Between Each distance 1 day for analize
- **Weekend Test:** During Weekend,we will test all distances every hour (at 04:00 the longest one will be tested)

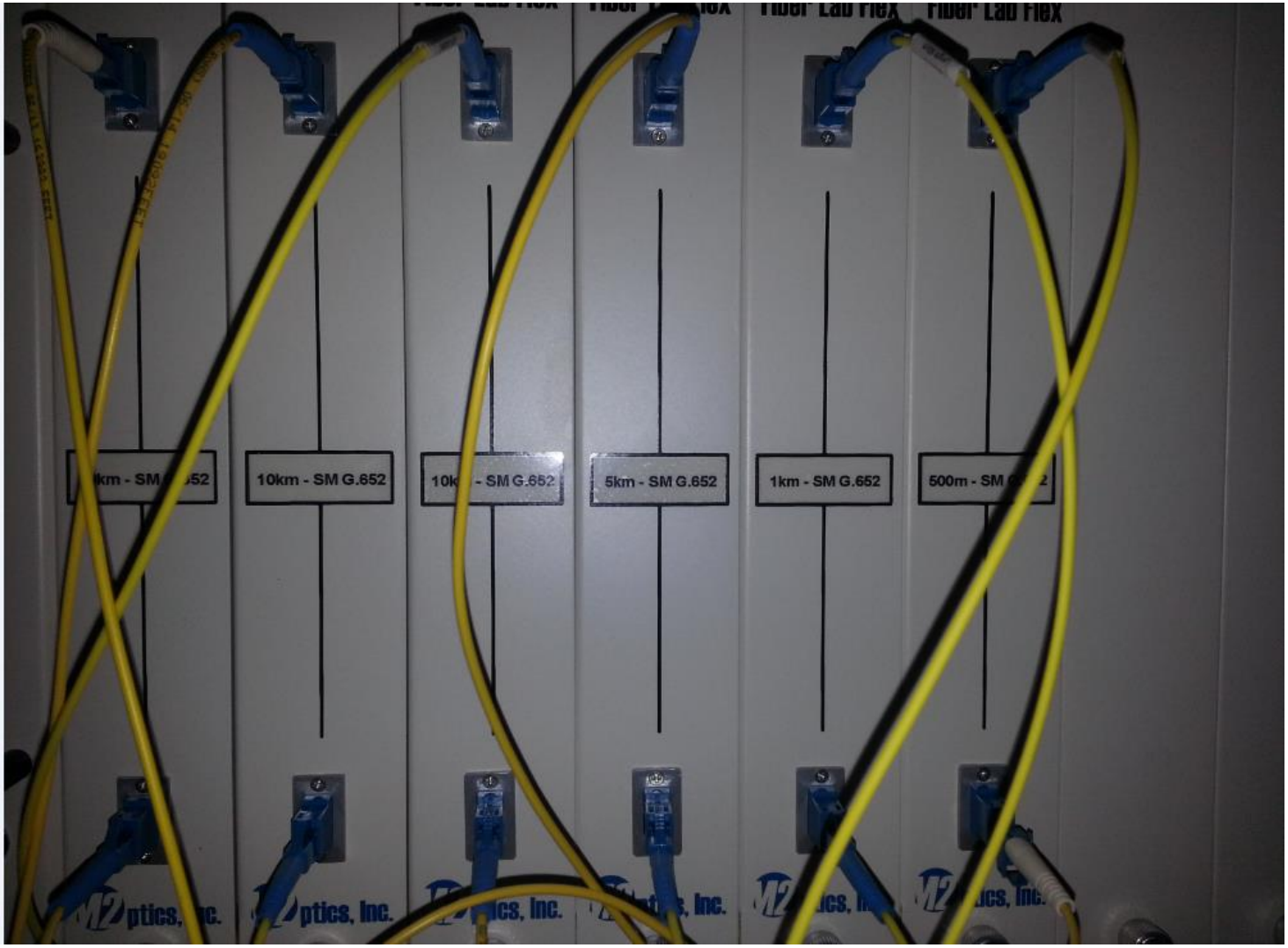
Implementing Test Environment



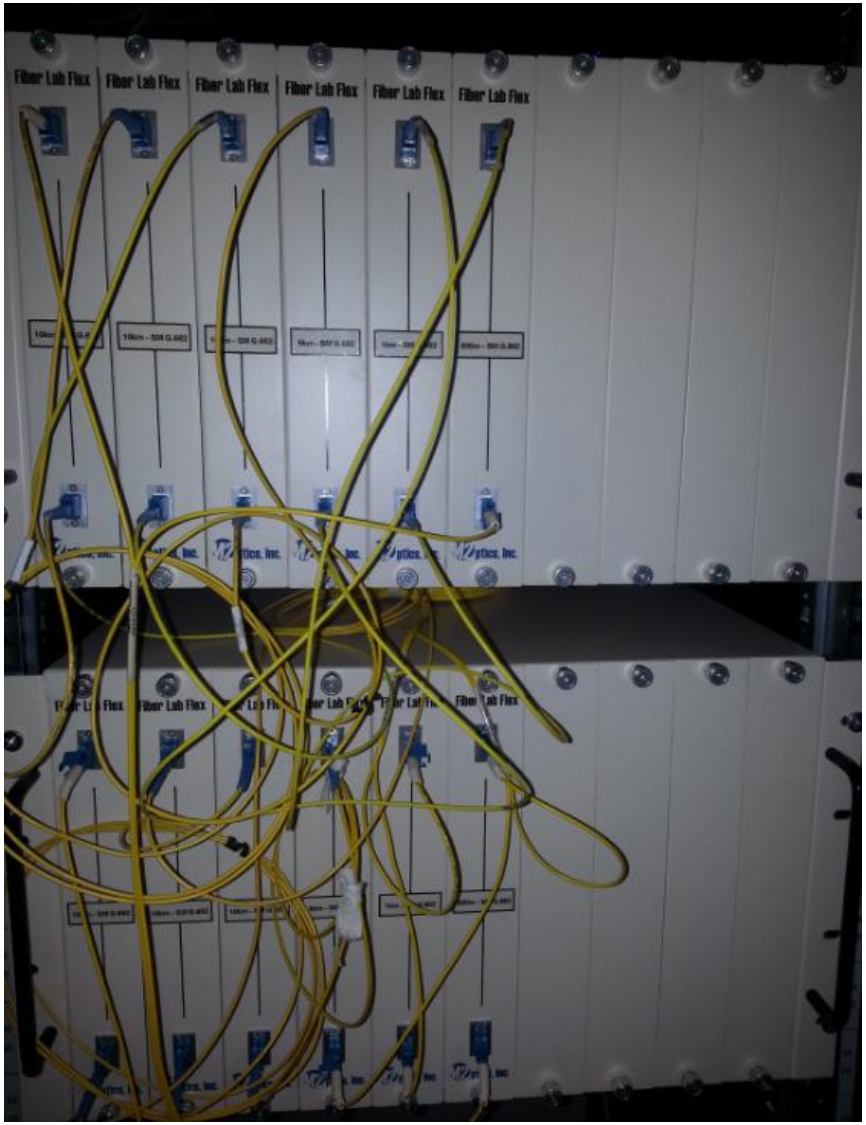
New Devices – ADVA DWDMs



New Devices- Fiber Spool (Fiber Suitcase)



New Devices - Fiber Spool (Fiber Suitcase)

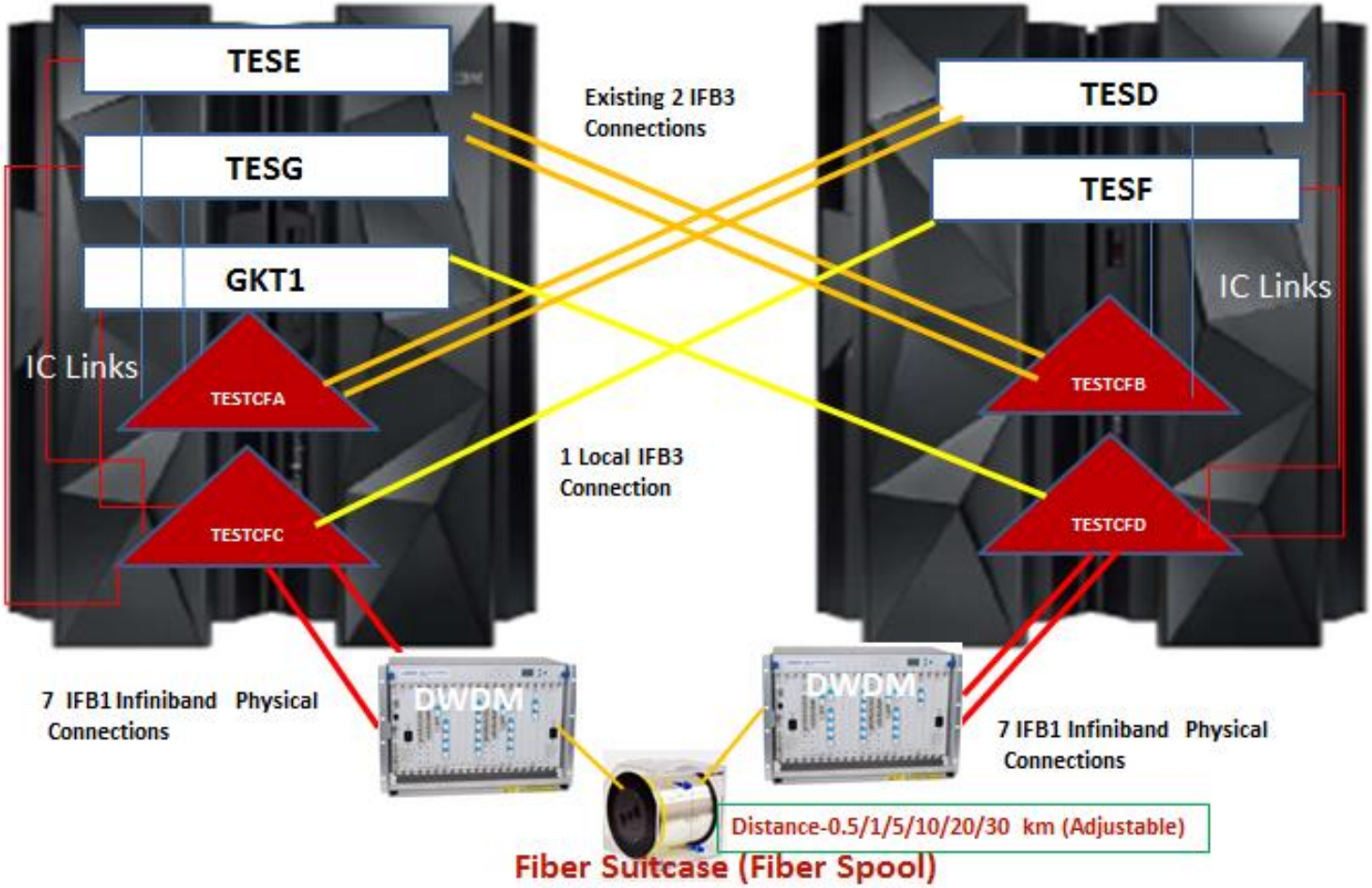


New IFB Cards - New ICF processors

- 3 New IFB1 Cards For Each CEC - Long Distance CF Connection
- 1 Additional ICF processor For Each CEC

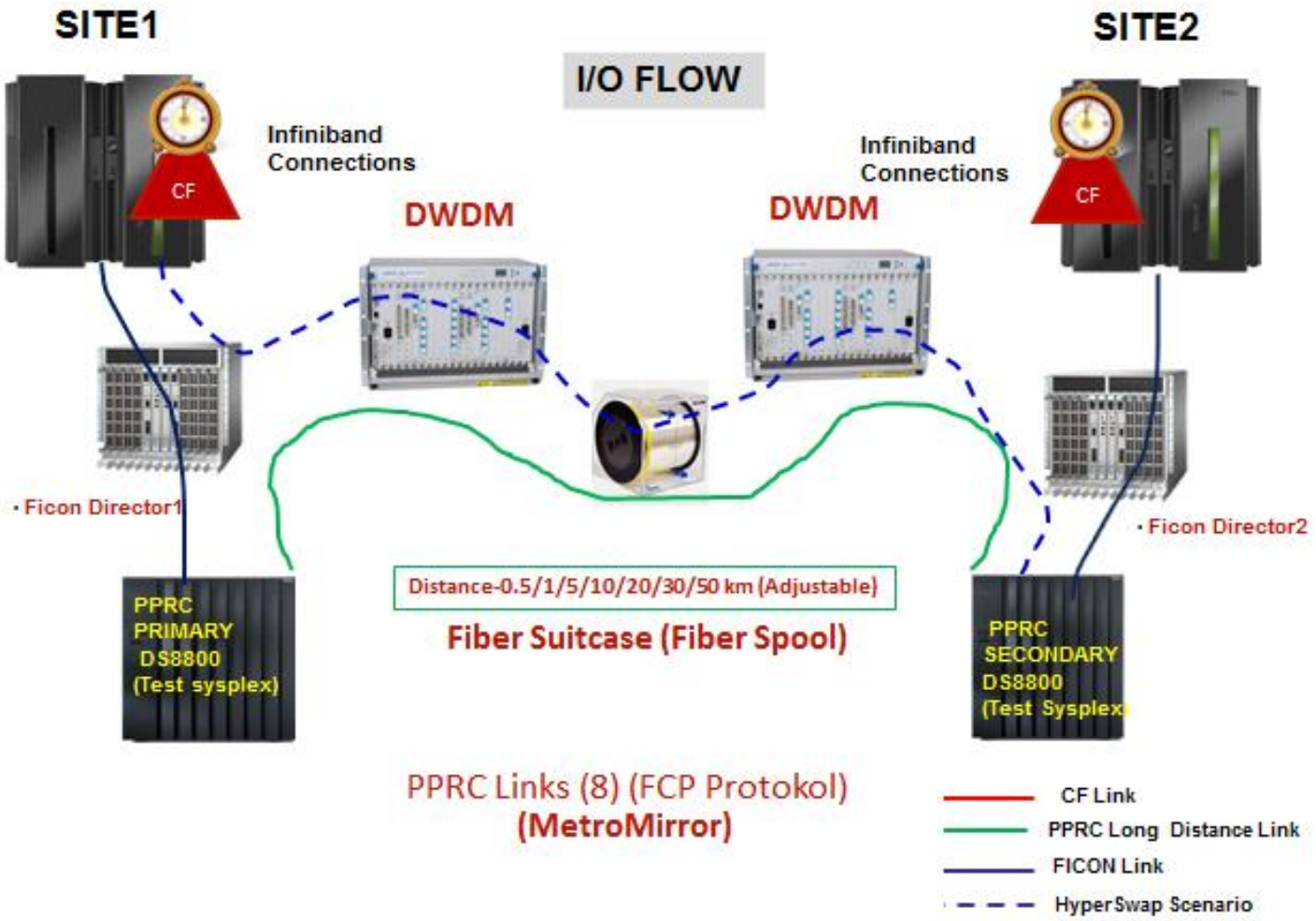
You Can NOT Use IFB12s For Long Distance CF Connection. IFB1s were needed

Implementing Test Environment

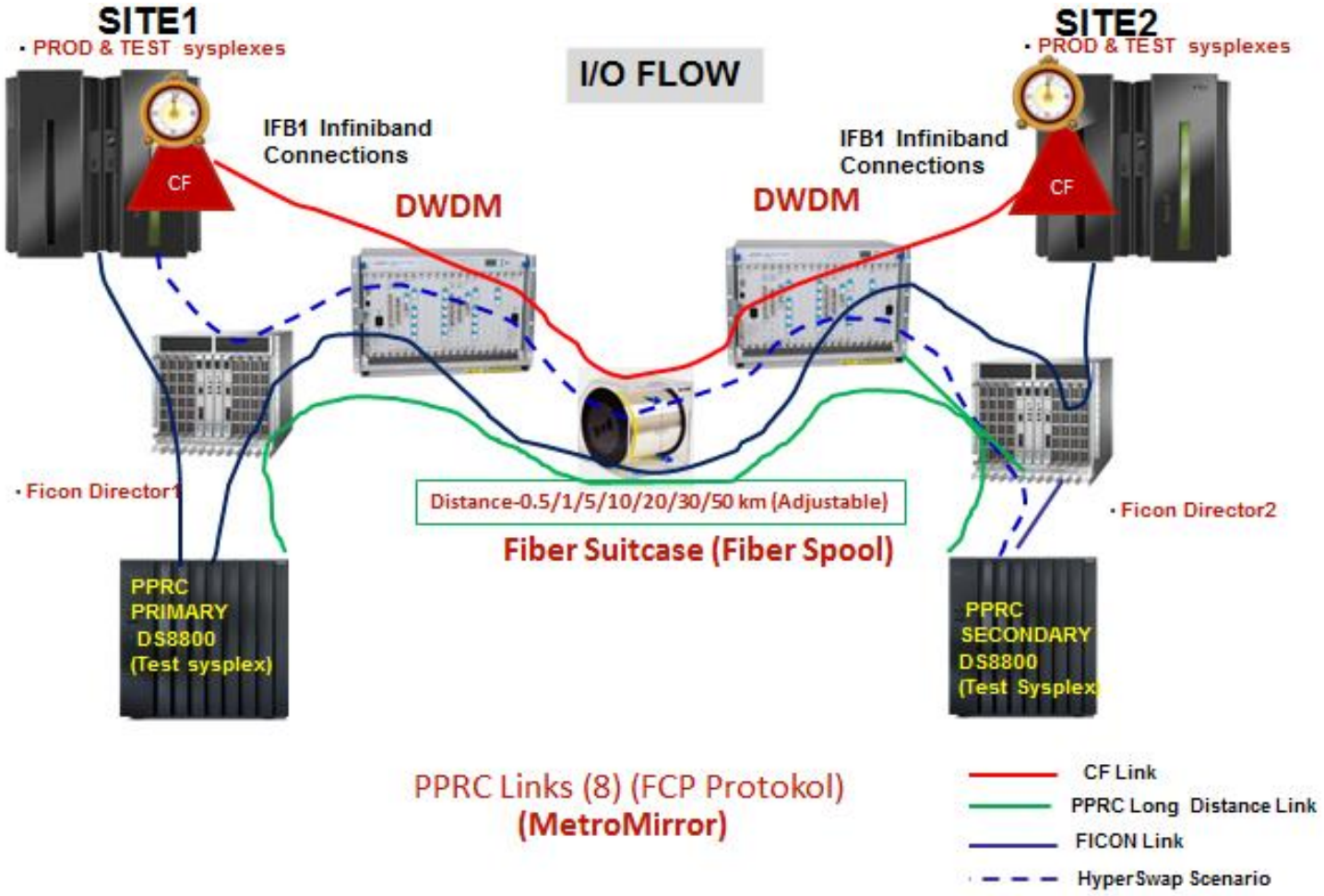


Although Drawing Shows as if There is CF-toCF communication, infact, CF Links Are Used To Do Communication Between One LPAR & One CF They are not used for LPAR-LPAR or CF-CF Communication . It is shown like this just to make drawing much more simple

Active – Standby I/O Flow



Active- Active Hyperswap Senario



CF – IODF Definition Change

- One CF can have Up To 8 CF Links

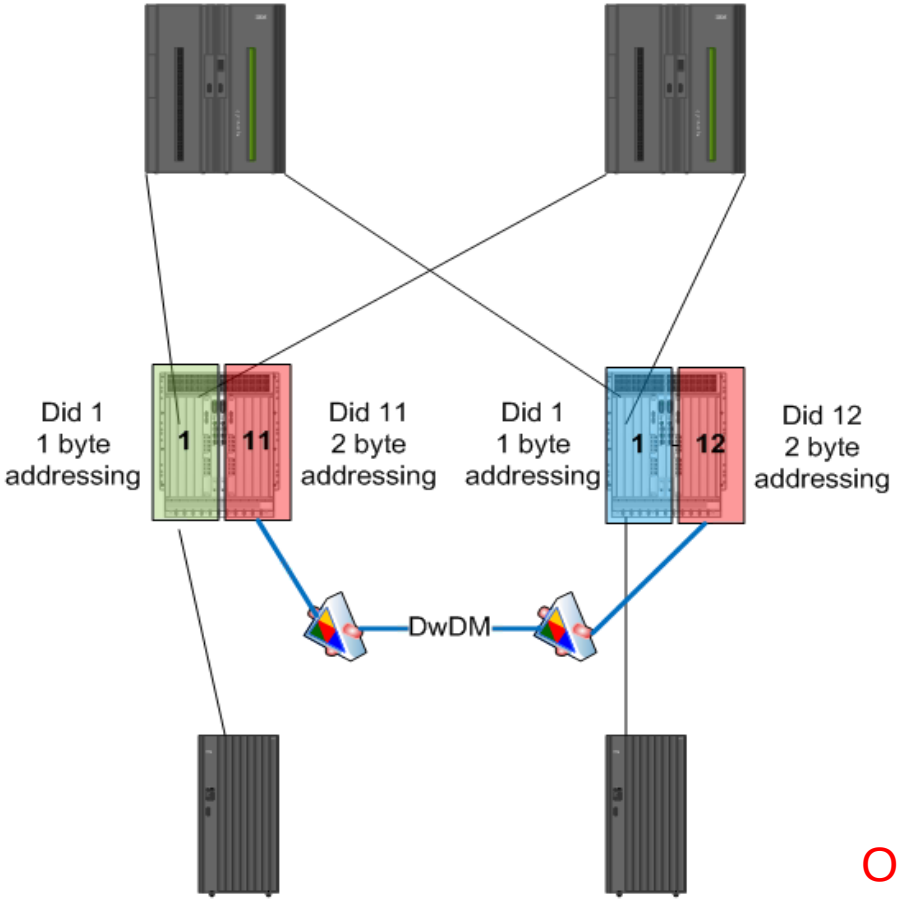
Hint: If you have defined your CF LPARs as z/OS/CF LPAR in IODF,
You can Not reach to 8 even!.
You need to change LPAR definition From z/OS/CF to CF Only

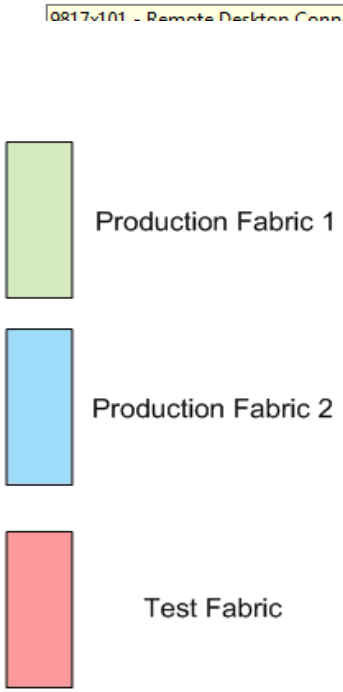
- 1 Additional ICF processor For Each CEC

You Can NOT Use IFB12s For Long Distance CF Connection. IFB1s were needed

Implement Cascaded FICON Director

- **Create 2 New Virtual Switches**
- **Move From 1byte to 2byte Addressing**





On its own a big project

Implement Cascaded FICON Director

- Be careful about Necessary IODF Definitions
- Move Ports From One Switch To Another * Disk HA port might have been painfull
- `Very Careful Planning` is a MUST
- Watch Out How Much Path You Need During IODF Activation

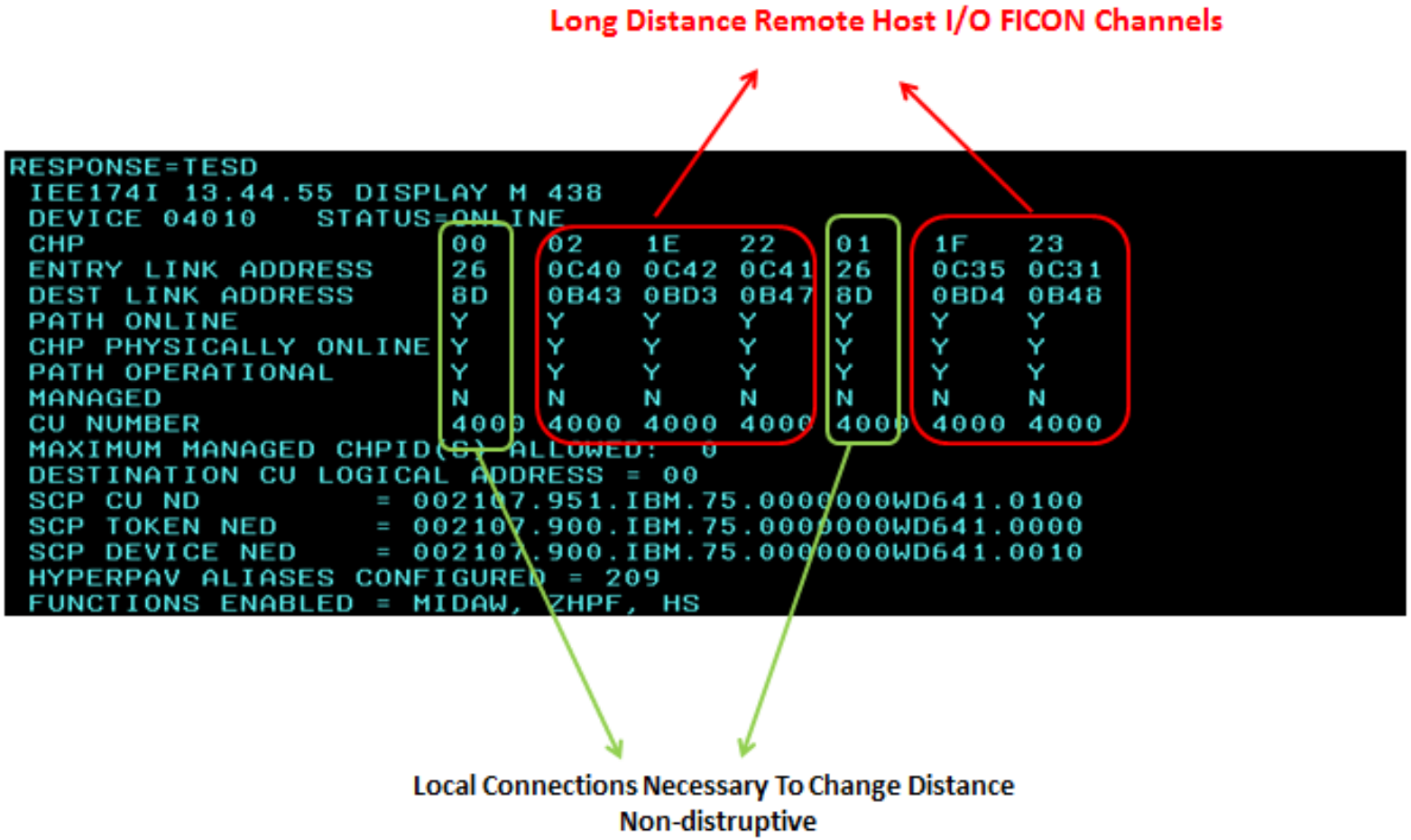
(Paths that need a change should be OFFLINE while activating New IODFs)

We did NOT move any Disk HA port , we used brand new onces.
We did move zEC12 FICON Channel Director ports

Hint : A CNTL can have both 1byte and 2 byte but A Channel Can NOT
Heard some customers had an outage because of this mistake

You can easily come up with Too Many IODF Activations To Implement This
We had to do this with at least 4 IODF Activations

And The Result …FICON Connection



Connections Of New CFs

TESTCFC - Long Distance CF – Connection Display

```
RESPONSE=TESD
 IXL150I   21.48.58   DISPLAY CF 360
 COUPLING FACILITY 002827.IBM.84.00000003E317
                   PARTITION: 0C   CPCID: 00
                   LP NAME: TESTCFC    CPC NAME: P003E317
                   CONTROL UNIT ID: FFF0
 NAMED TESTCFC
 COUPLING FACILITY SPACE UTILIZATION
  ALLOCATED SPACE                    DUMP SPACE UTILIZATION
   STRUCTURES:          3519 M         STRUCTURE DUMP TABLES:          0 M
   DUMP SPACE:             2 M                 TABLE COUNT:          0
  FREE SPACE:           2147 M        FREE DUMP SPACE:                2 M
 TOTAL SPACE:           5668 M       TOTAL DUMP SPACE:                2 M
                                    MAX REQUESTED DUMP SPACE:          0 M
    VOLATILE:              NO
     CFLEVEL:              19
     CFCC RELEASE 19.00, SERVICE LEVEL 02.17
     BUILT ON 01/19/2015 AT 10:30:00
     STORAGE INCREMENT SIZE: 1 M
     STORAGE-CLASS MEMORY INCREMENT SIZE: 1 M
     COUPLING FACILITY HAS 0 SHARED AND 1 DEDICATED PROCESSORS
     DYNAMIC CF DISPATCHING: OFF
     COUPLING FACILITY IS NOT STANDALONE
     COUPLING THIN INTERRUPTS: NOT-ENABLED

 CF REQUEST TIME ORDERING: REQUIRED AND ENABLED

 STORAGE CONFIGURATION      ALLOCATED              FREE            TOTAL
  CONTROL SPACE:               3521 M            2147 M           5668 M
  NON-CONTROL SPACE:              0 M               0 M              0 M
  STORAGE-CLASS MEMORY:           0 M               0 M              0 M

 PATH          PHYSICAL                LOGICAL   CHANNEL TYPE       AID   PORT
 35 / 0000     ONLINE                  ONLINE    CIB 1X-IFB         0008  02
 36 / 0000     ONLINE                  ONLINE    CIB 1X-IFB         000A  02
 37 / 0000     ONLINE                  ONLINE    CIB 1X-IFB         0018  02
 38 / 0000     ONLINE                  ONLINE    CIB 1X-IFB         0008  03
 39 / 0000     ONLINE                  ONLINE    CIB 1X-IFB         000A  03
 3A / 0000     ONLINE                  ONLINE    CIB 1X-IFB         0018  03
 3B / 0000     ONLINE                  ONLINE    CIB 1X-IFB         0008  04
 44 / 0000     OFFLINE                 ONLINE    CIB 12X-IFB3       001B  02

 COUPLING FACILITY SUBCHANNEL STATUS
  TOTAL:   231    IN USE:    19    NOT USING:   205    NOT USABLE:     7
```

1 Local Connection – To make nondistruptive distance change

7 Long Distance Connections That Go Through ADVA

Rearranging CFRM Policy -Structure replacement CF – Data Center-I (TESTCFC)

```
RESPONSE=TESD
 IXC362I  19.47.07  DISPLAY XCF 300
 CFNAME: TESTCFC
   COUPLING FACILITY      :   002827.IBM.84.00000003E317
                              PARTITION: 0C   CPCID: 00
   SITE                   :   N/A
   POLICY DUMP SPACE SIZE:    2000 K
   ACTUAL DUMP SPACE SIZE:    2 M
   STORAGE INCREMENT SIZE:    1 M

   CONNECTED SYSTEMS:
   GKT1     TESD     TESE     TESF     TESG

   MONITORING SYSTEM: GKT1

   STRUCTURES:
   DSNAT0B_GBP0(OLD)       DSNAT0B_GBP1(OLD)       DSNAT0B_GBP16K0(OLD)
   DSNAT0B_GBP32K(OLD)     DSNAT0B_GBP8K0(OLD)     DSNAT0B_LOCK1
   DSNAT0B_SCA             DSNDV0B_GBP0(OLD)       DSNDV0B_GBP1(OLD)
   DSNDV0B_GBP15(OLD)      DSNDV0B_GBP16K0(OLD)    DSNDV0B_GBP2(OLD)
   DSNDV0B_GBP32K(OLD)     DSNDV0B_GBP8K0(OLD)     DSNDV0B_LOCK1
   DSNDV0B_SCA             DSNPF0B_GBP0(OLD)       DSNPF0B_GBP1(OLD)
   DSNPF0B_GBP16K0(OLD)    DSNPF0B_GBP2(OLD)       DSNPF0B_GBP32K(OLD)
   DSNPF0B_GBP8K0(OLD)     DSNPF0B_LOCK1           DSNPF0B_SCA
   DSNTE0B_GBP0(OLD)       DSNTE0B_GBP1(OLD)       DSNTE0B_GBP15(OLD)
   DSNTE0B_GBP16K0(OLD)    DSNTE0B_GBP2(OLD)       DSNTE0B_GBP32K(OLD)
   DSNTE0B_GBP8K0(OLD)     DSNTE0B_LOCK1           DSNTE0B_SCA
   DSNUA0B_GBP0(OLD)       DSNUA0B_GBP1(OLD)       DSNUA0B_GBP15(OLD)
   DSNUA0B_GBP16K0(OLD)    DSNUA0B_GBP2(OLD)       DSNUA0B_GBP32K(OLD)
   DSNUA0B_GBP8K0(OLD)     DSNUA0B_LOCK1           DSNUA0B_SCA
   IMST_IRLM               IMST_OSAM               IMST_RM
   IMST_V_TCRF0100A        IMST_VSAM               IMSU_IRLM
   IMSU_OSAM               IMSU_RM                 IMSU_VSAM
   ISGLOCK                 ISTGENERIC              IXCSTR1
   IXCSTR2                 IXCSTR3                 IXCSTR4
   IXC64K1                 IXC64K2                 IXC8K1
   IXC8K2                  OPERLOGT                RRS_DELAYEDUR_1
   RRS_MAINUR_1            RRS_RESTART_1           RRS_RMDATA_1
   SYSIGGCAS_ECS
```

Rearranging CFRM Policy -Structure replacement CF- Data Center – II (TESTCFD)

```
SDSF OPERLOG  DATE 08/05/2015    25 WTORS                    COMMAND ISSUED
RESPONSE=TESD
 IXC362I  19.46.01  DISPLAY XCF 224
 CFNAME: TESTCFD
   COUPLING FACILITY      :   002827.IBM.84.00000003E337
                              PARTITION: 0B   CPCID: 00
   SITE                   :   N/A
   POLICY DUMP SPACE SIZE:    2000 K
   ACTUAL DUMP SPACE SIZE:    2 M
   STORAGE INCREMENT SIZE:    1 M

   CONNECTED SYSTEMS:
   GKT1     TESD     TESE     TESF     TESG

   MONITORING SYSTEM: GKT1

   STRUCTURES:
   DSNAT0B_GBP0(NEW)       DSNAT0B_GBP1(NEW)       DSNAT0B_GBP16K0(NEW)
   DSNAT0B_GBP32K(NEW)     DSNAT0B_GBP8K0(NEW)     DSNDV0B_GBP0(NEW)
   DSNDV0B_GBP1(NEW)       DSNDV0B_GBP15(NEW)      DSNDV0B_GBP16K0(NEW)
   DSNDV0B_GBP2(NEW)       DSNDV0B_GBP32K(NEW)     DSNDV0B_GBP8K0(NEW)
   DSNPF0B_GBP0(NEW)       DSNPF0B_GBP1(NEW)       DSNPF0B_GBP16K0(NEW)
   DSNPF0B_GBP2(NEW)       DSNPF0B_GBP32K(NEW)     DSNPF0B_GBP8K0(NEW)
   DSNTE0B_GBP0(NEW)       DSNTE0B_GBP1(NEW)       DSNTE0B_GBP15(NEW)
   DSNTE0B_GBP16K0(NEW)    DSNTE0B_GBP2(NEW)       DSNTE0B_GBP32K(NEW)
   DSNTE0B_GBP8K0(NEW)     DSNUA0B_GBP0(NEW)       DSNUA0B_GBP1(NEW)
   DSNUA0B_GBP15(NEW)      DSNUA0B_GBP16K0(NEW)    DSNUA0B_GBP2(NEW)
   DSNUA0B_GBP32K(NEW)     DSNUA0B_GBP8K0(NEW)     IMST_V_TCRF0100B
```

PPRC Links

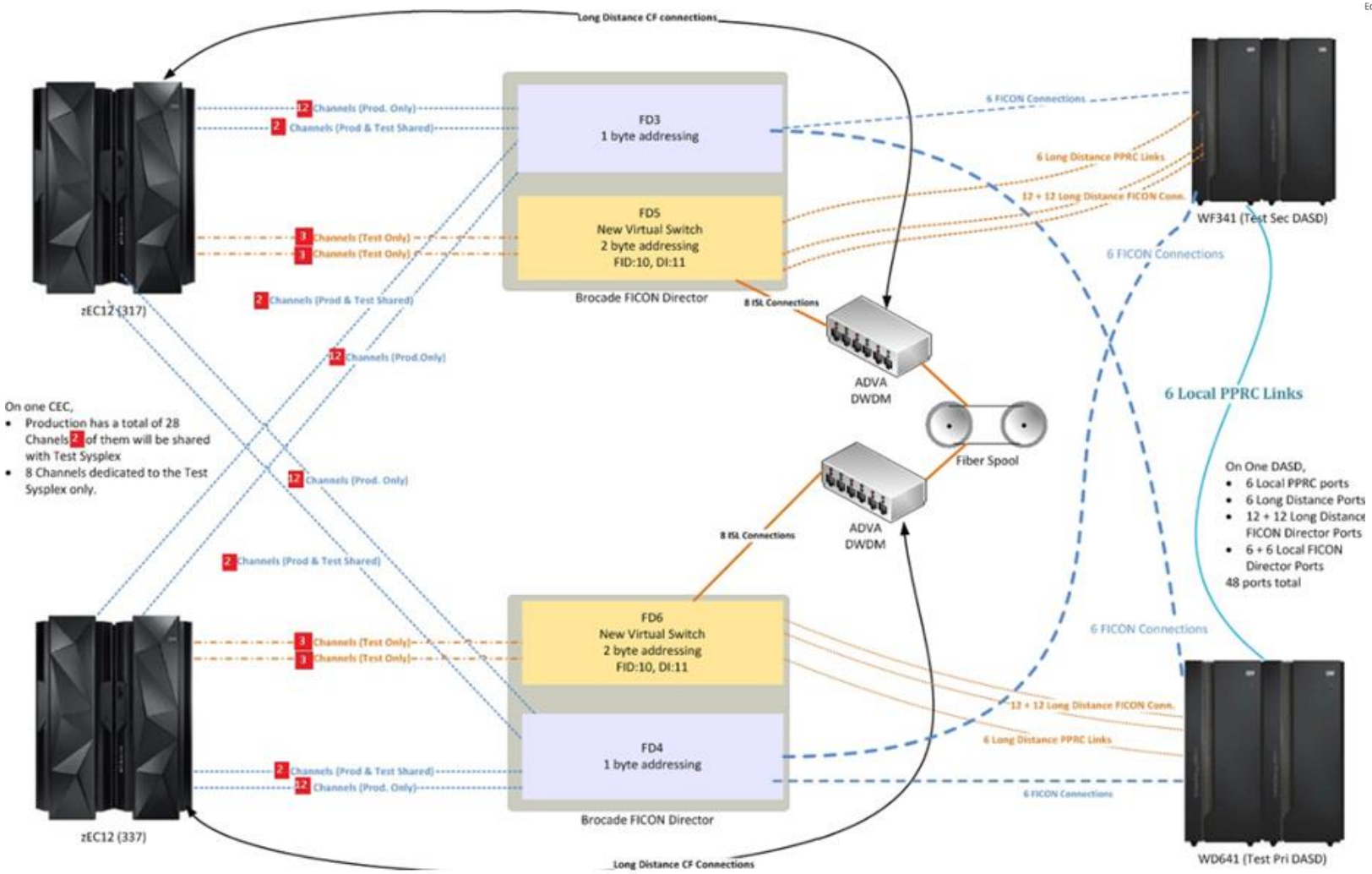
```
VPCPQSTC   Dasd Mirroring Status =  OK    Monitor2 time = 01:00:05   GKT1
Actions: Q ueryPath Z QueryReverse V iew devices X ceptions D elpath E stpath
 Tot Pairs: 934                                                S econdary
  -PRI-SSID-SEC-  F CP ---------------- LINKS (LINK-STATUS) ----------------
_ 4001 ==== 7001  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4101 ==== 7101  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4201 ==== 7201  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4301 ==== 7301  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4401 ==== 7401  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4501 ==== 7501  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4601 ==== 7601  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4701 ==== 7701  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4801 ==== 7801  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4901 ==== 7901  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4A01 ==== 7A01  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4B01 ==== 7B01  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4C01 ==== 7C01  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4D01 ==== 7D01  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4E01 ==== 7E01  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
_ 4F01 ==== 7F01  Y NF  07030703-13 01310131-13 04330433-13 06330633-13  More
1 Epair 2 Dpair 3 Suspend 4 Resynch 5 Monitor2 6 Q Paths 7 Epath 8 Dpath
9 CopyOptions 11 Find 21 FCEp 22 FCEs 23 FCWp 24 FCWs
Selection ===> _
  F1=Help   F3=Return          F6=Roll   F7=Up     F8=Down   F11=Right
```

PPRC Links

```
VPCPMSG1                              PPRC Paths
   Primary unit
            SSID:        4001
          SERIAL:       00WD641
            WWNN:   500507630AFFC611

 Secondary CUs         ---- 1 ----     ---- 2 ----
            SSID:        7001
          SERIAL:       00WF341
 Number of links:          6
     Link/Status:
         Link Ö1:     04330433 13
         Link Ö2:     05030503 13
         Link Ö3:     07030703 13
         Link Ö4:     06330633 13
         Link Ö5:     01310131 13
         Link Ö6:     00010001 13
         Link Ö7:
         Link Ö8:
       WWNN(1/2):     50050763
       WWNN(2/2):     0AFFC638

   F1=Help              F3=Return
```

6 Local
Or
6 Remote

Connecting The Dots…



Active - Standby

Environment	Configuration	Test Type	Workload	Task	Remote Resources	Distance
TEST	Active-StandBy	Scalability	Synthetic	Verify that the underlying infrastructure, when running over distance can actually sustain PPRC activity rates seen in production	Secondary DASD	1 Km, 10 Km, 30 Km
TEST	Active-StandBy	Application Performance	Real	Run selected pieces of the actual TEST workload at distance to assess the performace impact of the Active-StandBy configuration	Secondary DASD	0 Km, 0.5 Km, 1 Km, 5 Km, 10 Km, 20 Km, 30 Km
TEST	Active-StandBy	Operation	Real	Run the actual TEST environment at distance to familiarize with the new configuration	CF, Primary DASD, Secondary DASD	30 Km

Active - Active

Environment	Configuration	Test Type	Workload	Task	Remote Resources	Distance
TEST	Active-Active	Scalability	Synthetic	Verify that the underlying infrastructure, when running over distance can actually sustain CF, DASD I/O and PPRC activity rates seen in production	CF, Primary DASD, Secondary DASD	0 Km, 0.5 Km, 1 Km, 5 Km, 10 Km, 20 Km, 30 Km
TEST	Active-Active	Recovery / Reconfiguration	Synthetic	Verify the ability to move workloads across sites / to recover from CF/DASD/PPRC errors	CF, Primary DASD, Secondary DASD	30 Km
TEST	Active-Active	Application Performance	Real	Run selected pieces of the TEST workload at distance to assess the performace impact of the Active-Active configuration	CF, Primary DASD, Secondary DASD	0 Km, 0.5 Km, 1 Km, 5 Km, 10 Km, 20 Km, 30 Km
TEST	Active-Active	Operation	Real	Run the actual TEST environment at distance to familiarize with the new configuration	CF, Primary DASD, Secondary DASD	1 Km, 10 Km, 30 Km

Detailed - Table Of Cases

						Total number of tests so far : 52									Total elapsed (days) : 59	
Test Case	Status	Environment	Scenario	Test Type	Workload	Test Description	Distance								Elapsed Time (days)	Remote Resources
							0	0,5	1	5	10	20	30	46.5		
1	DONE	TEST		Infrastructure	Synthetic	CF Test			Y		Y		Y	Y	2	Remote CF Structures
2	Continue	TEST	Active-StandBy	Application Impact	Real	TBD - TEST IMS & DB2 Unload &High Write (Sort) Workload			Y		Y		Y	Y	2	PPRC Secondary DASD
3	Continue	TEST	Active-StandBy	Application Impact	Real	Run the complete workload over distance(PPRC Effect All			Y		Y		Y	Y	4	PPRC Secondary DASD
4	Plan	TEST	Active-Active	Infrastructure	Synthetic	Long Distance DASD and CF Effect and PPRC Effect			Y		Y		Y	Y	2	PPRC Primary DASD, PPRC Secondary DASD, CF Structures
5	Plan	TEST	Active-StandBy	Infrastructure	Synthetic	PPRC Initial Copy Effect			Y		Y		Y	Y	2	PPRC Secondary DASD
6	Plan					Long Distance PPRC Effect			Y		Y		Y	Y		PPRC Secondary DASD
7	Plan	TEST	Active-Active	Application Impact	Real	Run the complete workload over distance			Y		Y		Y	Y	4	PPRC Primary DASD, PPRC Secondary DASD, CF Structures
8	Plan	TEST	Active-Active	Operations	Real	Link Failure Freeze Effect									1	
9	Plan					GBP Structure Full Condition Check (CastOut Write Perf. Effect)										
10	Plan					Structure Rebuild Process ElapseTime Difference										
		TEST		Clean-Up		Clean Up Of Definitions & New Configurations									1	
						Create Executive Summary Documentation For Future										
						Clean Up Of Definitions & New Configurations									1	
11	Plan	PROD	Active-StandBy	Infrastructure	Synthetic(weekend)	Long Distance PPRC Effect			Y		Y		Y	Y	0,5	PPRC Secondary DASD
12	Plan	PROD	Active-StandBy	Application Impact	Real(Week)	Run the complete workload over distance	Y	Y	Y	Y	Y	Y	Y	Y	18	PPRC Secondary DASD
13	Plan	PROD	Active-Active	Infrastructure	Synthetic(weekend)	Long Distance DASD and CF Effect and PPRC Effect			Y		Y		Y	Y	2	PPRC Primary DASD, PPRC Secondary DASD, CF Structures
14	Plan	PROD	Active-Active	Application Impact	Real(Week)	Run the complete workload over distance	Y	Y	Y	Y	Y	Y	Y	Y	18	PPRC Primary DASD, PPRC Secondary DASD, CF Structures
		PROD		Clean-Up		Clean Up Of Definitions & New Configurations									1	
						Data Sharing Cost Analysis										
						Create Executive Summary Documentation										
						Optional Wrap-Up Tarihi										
						LPAR deact & CFRM Sysplex Policy & GDPS Configs										

Why Infrastructure Stress Tests ?

For each of the two use cases we are performing two kinds of infrastructure stress tests

1. Scalability
2. Recovery / Reconfiguration.

As the focus is infrastructure's scalability, these tests are being performed using synthetic workloads. We just need to be able to generate, in the test environment, a level/quality of CF/Dasd/Tapes I/O requests similar to that seen in production.

- For 1) we will use the test environment to verify that the underlying infrastructure, when extended over distance, can actually sustain the activity rate seen in production
- For 2) we will use the test environment to verify the recovery and reconfiguration procedures specific to a configuration over distance.

In addition we will run the TEST environment at distance for a long enough time period to familiarize with the new configuration from an operational standpoint.

Assumptions

- Active-Standby also known as Single Site Workload.

  In this use case all primary resources and all workloads are located in Site-1. Site-2 only hosts stand-by systems and secondary DASD / Tapes.

  To test this use case we just need to "move" PPRC Secondary DASD to Site-2

- Active-Active

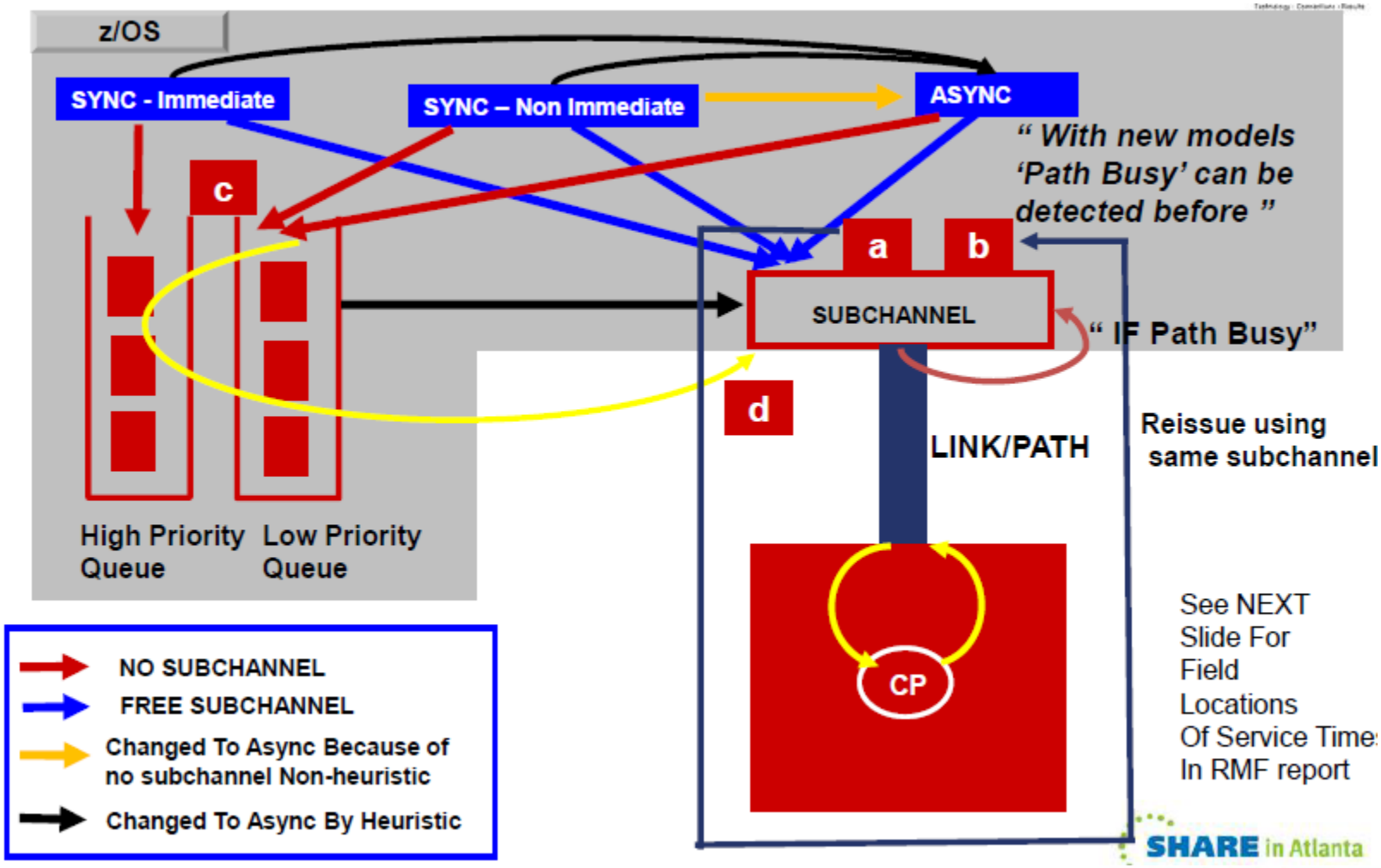
  In this use case all primary resources and SOME workloads are located in Site-1. Site-2 hosts SOME workloads and secondary DASD / Tapes.

  In additon to PPRC Secondary DASD located in Site-2 we also need to have active systems in Site-2 accessing site 1 primary CFs / DASD / Tapes remotely.

Visiting Performance Items

- CF Request
- I/O Request
- PPRC Effect

CF Request Types & Cases



Sync/Async Conversion

NON-HEURISTIC

- Subchannel Busy Condition
- Path Busy Condition
- Serialized List or Lock Contention

HEURISTIC

Introduced with z/OS v1r2...

- CF Link Technology
- Types Of Workload – Variable Workload Amount
- Range Of CF Utilization,Shared CP or not,...
- Actual Observed Sync Request Service Time
- Amount Of Data That Needs To Be Transfered
- Other items that effect CF response ex:Distance
- Moving Weighted Averages Of Actual CF Requests
- Every 1 of N Request not converted and send as Sync

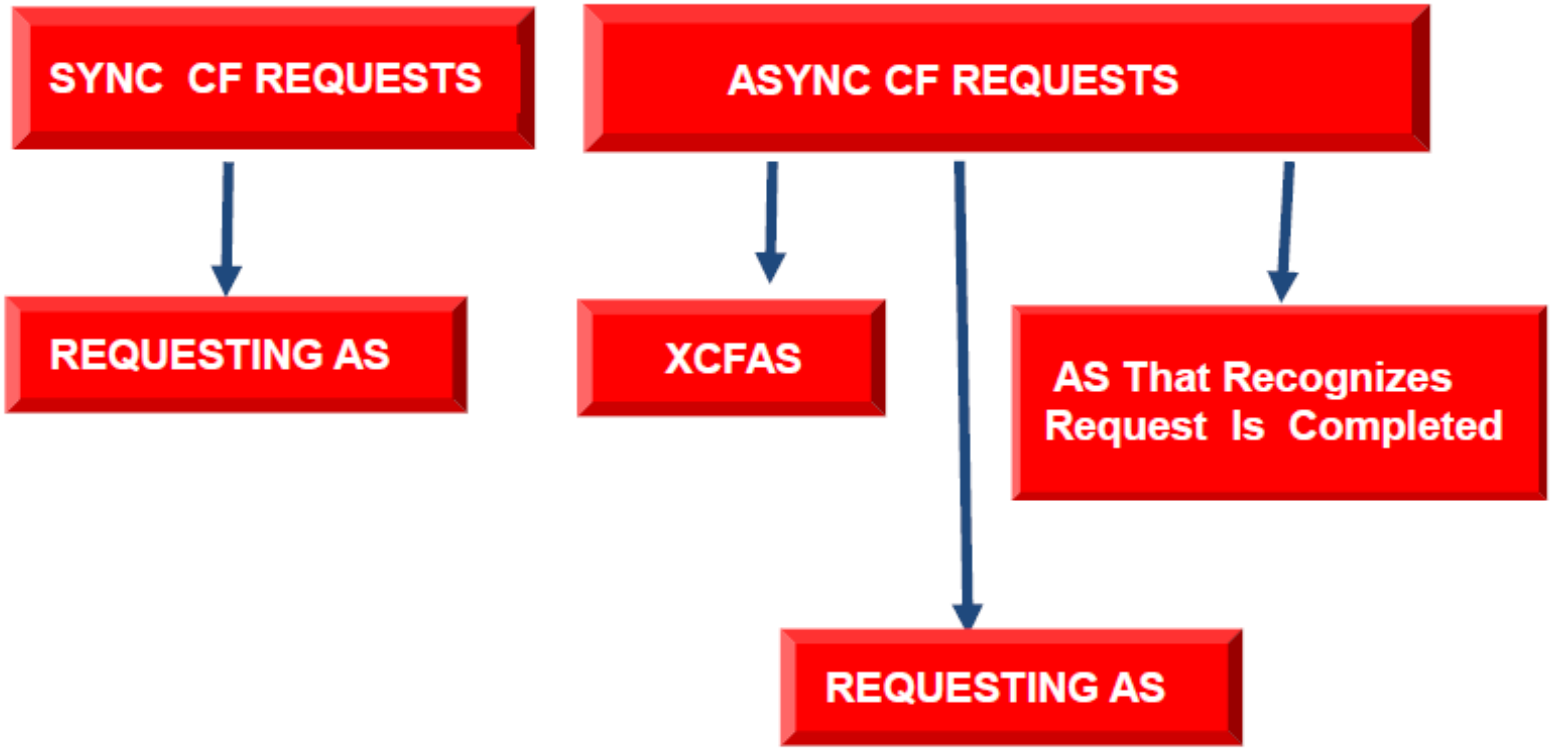
Sync/Async Conversion – Heuristic Threshold

We can see the threshold with 'D XCF,C' Command

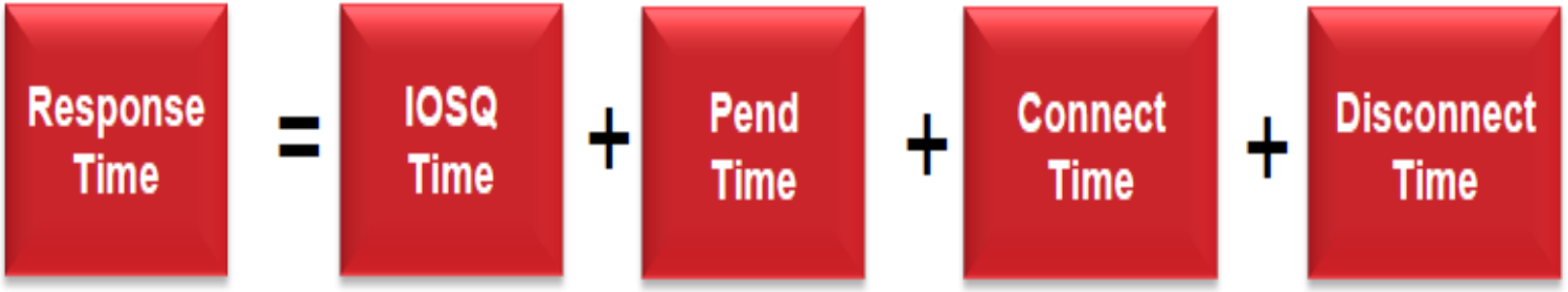
```
RESPONSE=TESD
 IXC357I  22.11.14  DISPLAY XCF 221
 SYSTEM TESD DATA
    INTERVAL    OPNOTIFY      MAXMSG     CLEANUP       RETRY    CLASSLEN
         165         168        2000          15          10         956

    SSUM ACTION  SSUM INTERVAL  SSUM LIMIT     WEIGHT  MEMSTALLTIME
        ISOLATE              0        NONE        N/A           N/A

    CFSTRHANGTIME
              N/A

    DEFAULT USER INTERVAL:     165
    DERIVED SPIN INTERVAL:     165
    DEFAULT USER OPNOTIFY: +     3

    MAX SUPPORTED CFLEVEL: 19

    MAX SUPPORTED SYSTEM-MANAGED PROCESS LEVEL: 19

    SYNC/ASYNC CONVERSION    THRESHOLD   -SOURCE-    DEFAULT
                 SIMPLEX            26    SYSTEM      IN USE
                  DUPLEX            26    SYSTEM      IN USE
           LOCK SIMPLEX             26    SYSTEM      IN USE
            LOCK DUPLEX             26    SYSTEM      IN USE

    CF REQUEST TIME ORDERING FUNCTION: INSTALLED

    COUPLING THIN INTERRUPTS: ENABLED

    SYSTEM STATUS DETECTION PARTITIONING PROTOCOL ELIGIBILITY:
      SYSTEM CANNOT TARGET OTHER SYSTEMS.
        REASON: SYSPLEX COUPLE DATA SET NOT FORMATTED FOR THE PROTOCOL
      SYSTEM IS NOT ELIGIBLE TO BE TARGETED BY OTHER SYSTEMS.
        REASON: SYSPLEX COUPLE DATA SET NOT FORMATTED FOR THE PROTOCOL

    SYSTEM NODE DESCRIPTOR: 002827.IBM.84.00000003E337
                            PARTITION: 02    CPCID: 00

    SYSTEM IDENTIFIER: E3372827 02000508

    NETWORK ADDRESS: N/A

    PARTITION IMAGE NAME: N/A
```

Customers Can Change This Threshold- NOT Recommended by IBM

CPU Cost Of CF Requests

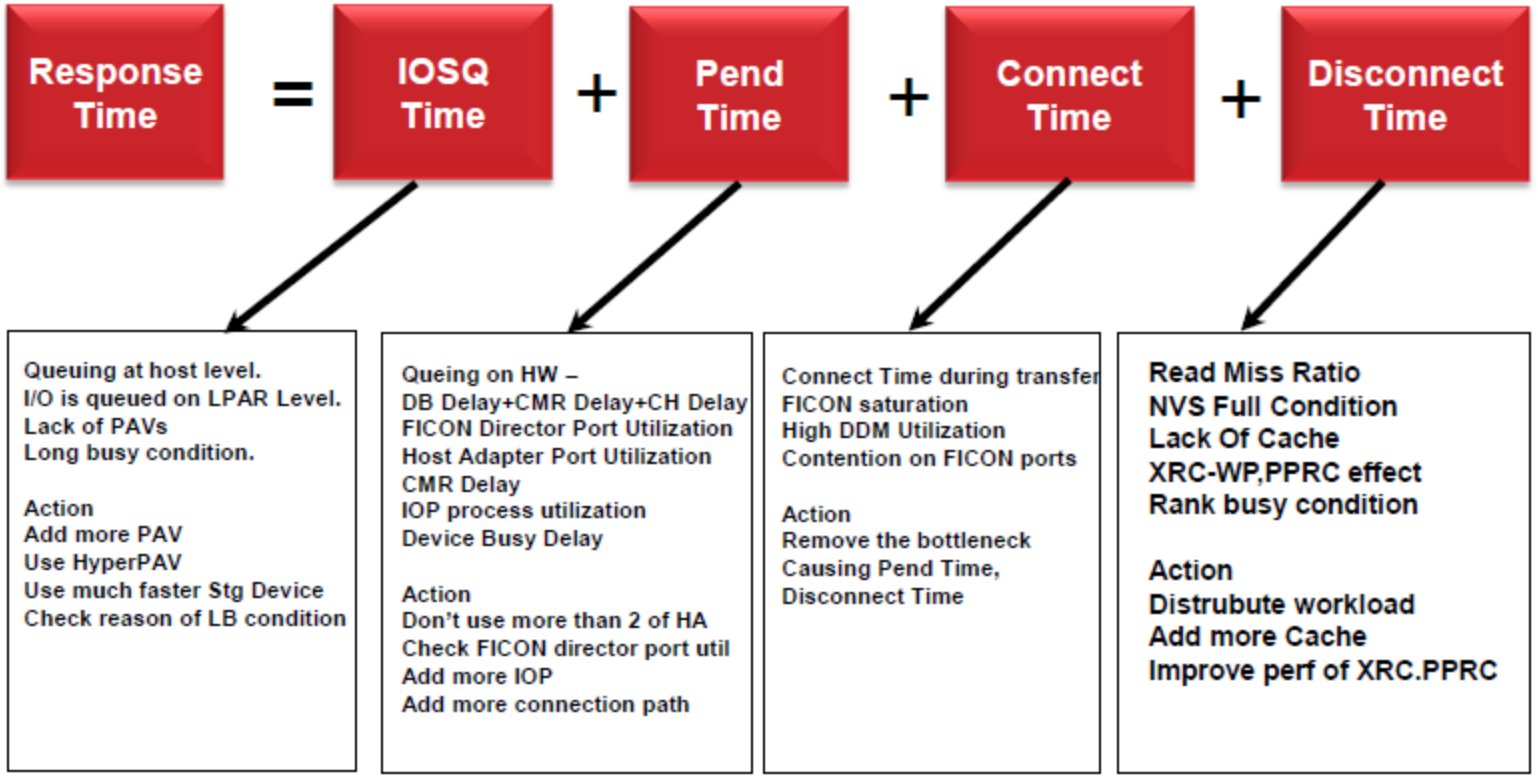


DASD I/O Response Time Components

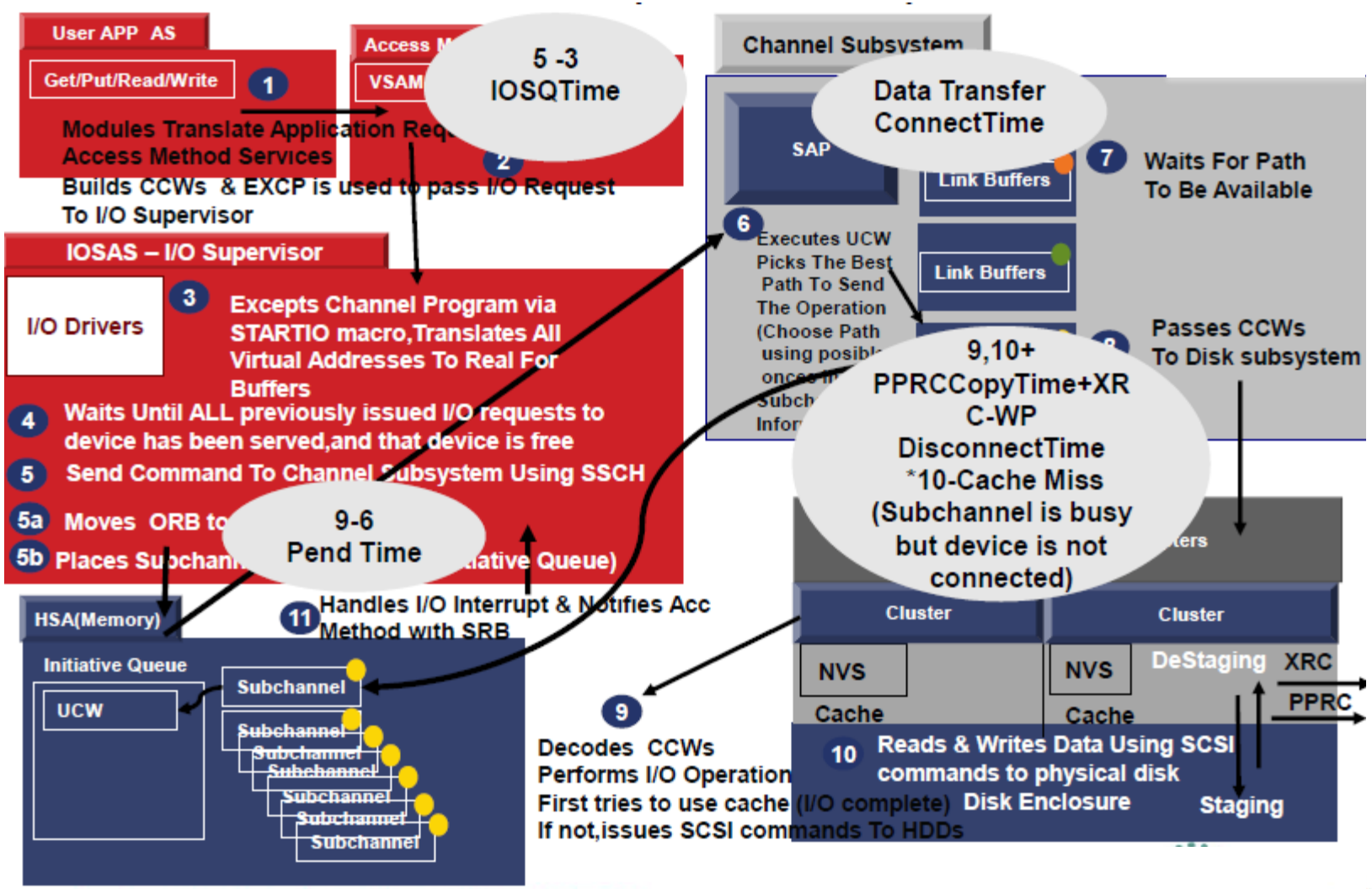


DASD I/O Response Time Components

What Are The Possible Reasons? Where To Look ? What To Do ?



Life Of I/O & Response Time Components



Long Distance CF Effect

0,5 Km - All Structures – TESTPLEX – Sample Snapshot

Connection between LPAR & CF That Are Located In Different CECs: IFB1 Connection – Long Distance

Sync Converted To Async Because Of Heuristic : Threshold : 26 microsec

Service Times Are In Microseconds

RMF V1R13 CF Systems - ISPLEXT Line 1 of 16

Samples: 100 Systems: 4 Date: 05/21/15 Time: 09.59.00 Range: 100 Sec

CF Name	System	Subchannel Delay %	Subchannel Busy %	-- Paths -- Avail	-- Paths -- Delay %	-- Sync --- Rate	-- Sync --- Avg Serv	------- Async ------- Rate	------- Async ------- Avg Serv	------- Async ------- Chng %	------- Async ------- Del %
TESTCFA	TESD			2							
	TESE			2							
	TESF			2							
	TESG			2							
TESTCFB	TESD			2							
	TESE			2							
	TESF			2							
	TESG			2							
TESTCFC	TESD	0.0	0.0	7	0.0	5.2	41	541.2	69	0.0	0.0
	TESE	0.0	0.1	2	0.0	1026	2	742.1	23	0.0	0.0
	TESF	0.0	0.0	7	0.0	0.9	41	274.3	72	0.0	0.0
	TESG	0.0	0.1	2	0.0	92.8	3	259.1	28	0.0	0.0
TESTCFD	TESD	0.0	0.1	2	0.0	5.1	3	858.3	18	0.0	0.0
	TESE	0.0	0.0	7	0.0	<0.1	46	316.1	82	0.0	0.0
	TESF	0.0	0.0	2	0.0	21.9	3	306.7	21	0.0	0.0
	TESG	0.0	0.0	7	0.0	<0.1	46	64.1	87	0.0	0.0

Connection between LPAR & CF That Are Located In Same CEC: IC Connection - Local

Long Distance CF Effect- How To Read Report

Sync Converted To Async Because Of Heuristic : Threshold : 26 microsec

No Subchannel Busy % : Did Wat We could do with Technolocy : No Changed Req Because Of Non-Heuristic

RMF V1R13 CF Systems - ISPLEXT Line 1 of 16

Samples: 100 Systems: 4 Date: 05/21/15 Time: 09.59.00 Range: 100 Sec

CF Name	System	Subchannel Delay %	Subchannel Busy %	-- Paths -- Avail	Paths Delay %	Sync Rate	Sync Avg Serv	Async Rate	Async Avg Serv	Async Chng %	Async Del %
TESTCFA	TESD			2							
	TESE			2							
	TESF			2							
	TESG			2							
TESTCFB	TESD			2							
	TESE			2							
	TESF			2							
	TESG			2							
TESTCFC	TESD	0.0	0.0	7	0.0	5.2	41	541.2	69	0.0	0.0
	TESE	0.0	0.1	2	0.0	1026	2	742.1	23	0.0	0.0
	TESF	0.0	0.0	7	0.0	0.9	41	274.3	72	0.0	0.0
	TESG	0.0	0.1	2	0.0	92.8	3	259.1	28	0.0	0.0
TESTCFD	TESD	0.0	0.1	2	0.0	5.1	3	858.3	18	0.0	0.0
	TESE	0.0	0.0	7	0.0	<0.1	46	316.1	82	0.0	0.0
	TESF	0.0	0.0	2	0.0	21.9	3	306.7	21	0.0	0.0
	TESG	0.0	0.0	7	0.0	<0.1	46	64.1	87	0.0	0.0

Long Distance CF Effect

1 Km - All Structures – TESTPLEX – Sample Snapshot

Connection between LPAR & CF That Are Located In Different CECs: IFB1 Connection - Long Distance

Service Times Are In Microseconds

Samples: 100 Systems: 4 Date: 05/21/15 Time: 16.30.20 Range: 100 Sec

CF Name	System	Subchannel Delay %	Subchannel Busy %	-- Paths -- Avail	-- Paths -- Delay %	-- Sync --- Rate	-- Sync --- Avg Serv	------- Async ------- Rate	------- Async ------- Avg Serv	------- Async ------- Chng %	------- Async ------- Del %
TESTCFA	TESD			2							
	TESE			2							
	TESF			2							
	TESG			2							
TESTCFB	TESD			2							
	TESE			2							
	TESF			2							
	TESG			2							
TESTCFC	TESD	0.0	0.0	7	0.0	6.4	54	958.9	91	0.0	0.0
	TESE	0.0	0.1	2	0.0	1355	2	661.0	21	0.0	0.0
	TESF	0.0	0.0	7	0.0	2.9	53	584.2	82	0.0	0.0
	TESG	0.0	0.0	2	0.0	120.0	4	177.1	26	0.0	0.0
TESTCFD	TESD	0.0	0.1	2	0.0	13.5	3	610.4	21	0.0	0.0
	TESE	0.0	0.0	7	0.0	<0.1	51	252.6	79	0.0	0.0
	TESF	0.0	0.0	2	0.0	6.6	3	254.1	23	0.0	0.0
	TESG	0.0	0.0	7	0.0	<0.1	51	52.1	95	0.0	0.0

Connection between LPAR & CF That Are Located In Same CEC: IC Connection - Local

Long Distance CF Effect

5 Km - All Structures – TESTPLEX – Sample Snapshot

Connection between LPAR & CF That Are Located In Different CECs: IFB1 Connection - Long Distance

Service Times Are In Microseconds

Sync Converted To Async Because Of Heuristic : Threshold : 26 microsec

Samples: 100 Systems: 4 Date: 05/21/15 Time: 18.15.40 Range: 100 Sec

CF Name	System	Subchannel Delay %	Subchannel Busy %	-- Paths -- Avail	Paths Delay %	Sync Rate	Sync Avg Serv	Async Rate	Async Avg Serv	Async Chng %	Async Del %
TESTCFA	TESD			2							
	TESE			2							
	TESF			2							
	TESG			2							
TESTCFB	TESD			2							
	TESE			2							
	TESF			2							
	TESG			2							
TESTCFC	TESD	0.0	0.2	7	0.0	28.2	90	358.9	107	0.3	0.1
	TESE	0.0	0.1	2	0.0	920.0	2	593.7	31	0.0	0.0
	TESF	0.0	0.2	7	0.0	20.1	89	481.3	108	0.0	0.0
	TESG	0.0	0.0	2	0.0	56.1	4	163.1	32	0.0	0.0
TESTCFD	TESD	0.0	0.1	2	0.0	6.4	3	621.5	30	0.0	0.0
	TESE	0.0	0.1	7	0.0	5.5	88	213.4	114	0.0	0.0
	TESF	0.0	0.1	2	0.0	6.8	3	237.3	30	0.0	0.0
	TESG	0.0	0.0	7	0.0	4.8	90	49.0	125	0.0	0.0

Connection between LPAR & CF That Are Located In Same CEC: IC Connection - Local

Long Distance CF Effect

10 Km - All Structures – TESTPLEX – Sample Snapshot

Connection between LPAR & CF That Are Located In Different CECs: IFB1 Connection - Long Distance

Service Times Are In Microseconds

Samples: 100 Systems: 4 Date: 05/21/15 Time: 18.45.40 Range: 100 Sec

CF Name	System	Subchannel Delay %	Subchannel Busy %	-- Paths -- Avail	-- Paths -- Delay %	-- Sync Rate	-- Sync Avg Serv	-- Async Rate	-- Async Avg Serv	-- Async Chng %	-- Async Del %
TESTCFA	TESD			2							
	TESE			2							
	TESF			2							
	TESG			2							
TESTCFB	TESD			2							
	TESE			2							
	TESF			2							
	TESG			2							
TESTCFC	TESD	0.0	0.1	7	0.0	3.1	135	281.3	159	0.0	0.0
	TESE	0.0	0.2	2	0.0	955.1	2	620.3	45	0.0	0.0
	TESF	0.0	0.1	7	0.0	4.7	136	387.4	162	0.0	0.0
	TESG	0.0	0.0	2	0.0	39.4	3	149.8	41	0.0	0.0
TESTCFD	TESD	0.0	0.2	2	0.0	6.5	3	598.7	44	0.0	0.0
	TESE	0.0	0.1	7	0.0	0.8	132	212.9	165	0.0	0.0
	TESF	0.0	0.1	2	0.0	7.1	3	228.0	45	0.0	0.0
	TESG	0.0	0.0	7	0.0	1.6	132	39.5	178	0.0	0.0

Connection between LPAR & CF That Are Located In Same CEC: IC Connection - Local

Long Distance CF Effect

20 Km - All Structures – TESTPLEX – Sample Snapshot

Connection between LPAR & CF That Are Located In Different CECs: IFB1 Connection - Long Distance

Service Times Are In Microseconds

Samples: 100 Systems: 4 Date: 05/21/15 Time: 18.56.40 Range: 100 Sec

CF Name	System	Subchannel Delay %	Subchannel Busy %	-- Paths -- Avail	-- Paths -- Delay %	-- Sync --- Rate	-- Sync --- Avg Serv	------- Async ------- Rate	------- Async ------- Avg Serv	------- Async ------- Chng %	------- Async ------- Del %
TESTCFA	TESD			2							
	TESE			2							
	TESF			2							
	TESG			2							
TESTCFB	TESD			2							
	TESE			2							
	TESF			2							
	TESG			2							
TESTCFC	TESD	0.0	1.5	7	0.0	12.9	235	1573	252	0.0	0.0
	TESE	0.0	0.2	2	0.0	897.3	2	272.1	71	0.0	0.0
	TESF	0.0	0.2	7	0.0	6.2	240	157.3	266	0.4	0.4
	TESG	0.0	0.1	2	0.0	37.4	3	154.7	61	0.0	0.0
TESTCFD	TESD	0.0	0.1	2	0.0	5.4	3	209.6	70	0.0	0.0
	TESE	0.0	0.1	7	0.0	2.5	234	91.3	284	0.0	0.0
	TESF	0.0	0.1	2	0.0	5.2	3	188.9	70	0.0	0.0
	TESG	0.0	0.0	7	0.0	2.7	234	40.0	280	0.0	0.0

Connection between LPAR & CF That Are Located In Same CEC: IC Connection - Local

Long Distance CF Effect

30 Km - All Structures – TESTPLEX – Sample Snapshot

Connection between LPAR & CF That Are Located In Different CECs: IFB1 Connection - Long Distance

Service Times Are In Microseconds

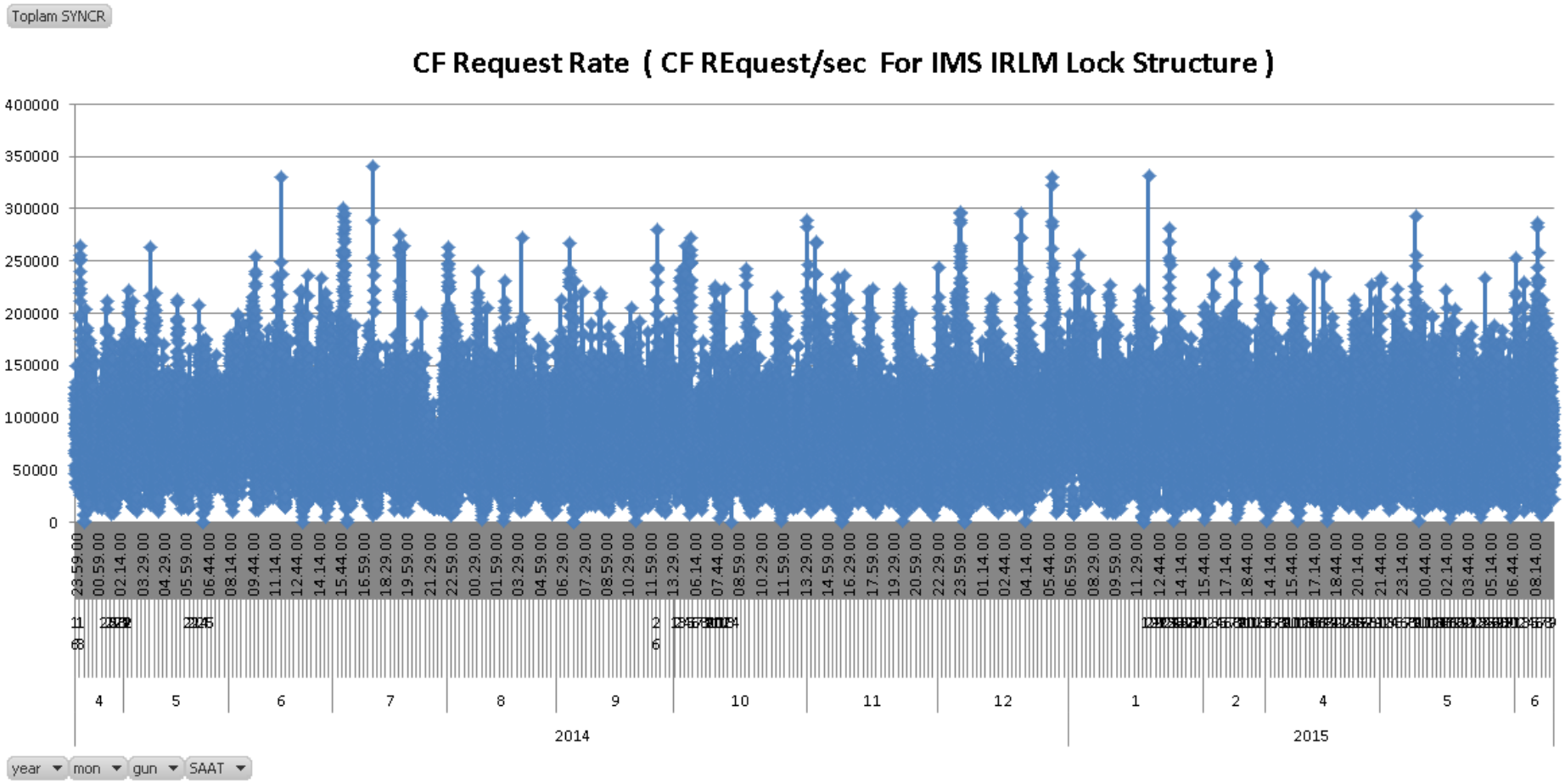
Samples: 100 Systems: 4 Date: 05/21/15 Time: 19.20.00 Range: 100 Sec

CF Name	System	Subchannel Delay %	Subchannel Busy %	-- Paths -- Avail	-- Paths -- Delay %	-- Sync --- Rate	-- Sync --- Avg Serv	------- Async ------- Rate	------- Async ------- Avg Serv	------- Async ------- Chng %	------- Async ------- Del %
TESTCFA	TESD			2							
	TESE			2							
	TESF			2							
	TESG			2							
TESTCFB	TESD			2							
	TESE			2							
	TESF			2							
	TESG			2							
TESTCFC	TESD	0.0	0.3	7	0.0	3.3	331	436.0	367	0.0	0.0
	TESE	0.0	0.5	2	0.0	926.8	2	661.4	101	0.0	0.0
	TESF	0.0	0.1	7	0.0	1.2	342	173.8	371	0.0	0.0
	TESG	0.0	0.1	2	0.0	56.1	3	208.5	88	0.0	0.0
TESTCFD	TESD	0.0	0.5	2	0.0	5.2	3	706.4	98	0.0	0.0
	TESE	0.0	0.2	7	0.0	0.1	334	229.4	372	0.0	0.0
	TESF	0.0	0.2	2	0.0	7.2	3	299.4	89	0.0	0.0
	TESG	0.0	0.0	7	0.0	<0.1	337	60.8	386	0.0	0.0

Connection between LPAR & CF That Are Located In Same CEC: IC Connection - Local

Production CF Request Rate

IMS Lock Structure CF Request Rates



Running Workload – Remote PPRC & I/O

We have run 3 different Workloads,

- ✓ Which will be the most I/O bound onces.
- ✓ Exists many times on our production Batch Run.
- ✓ That will be effected from distance the most.

- ➢ IMS Unload
- ➢ DB2 Unload
- ➢ Sort Workload

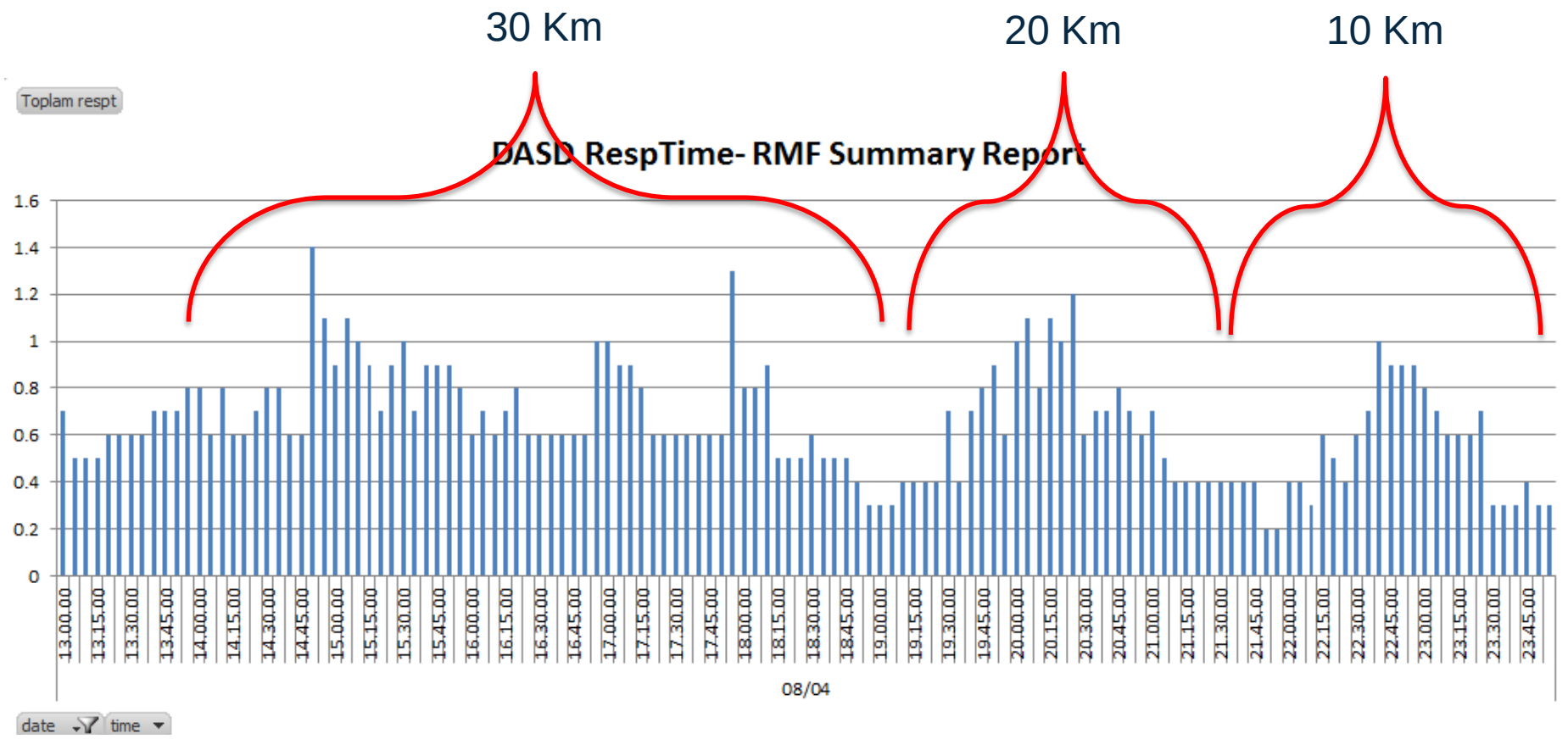
- Make service class SYSSTC - Remove the effect of CPU delay
- Force sort to use same memory items at each Run.
- Run several times.

Running Workload – Remote PPRC & I/O

fx TESD

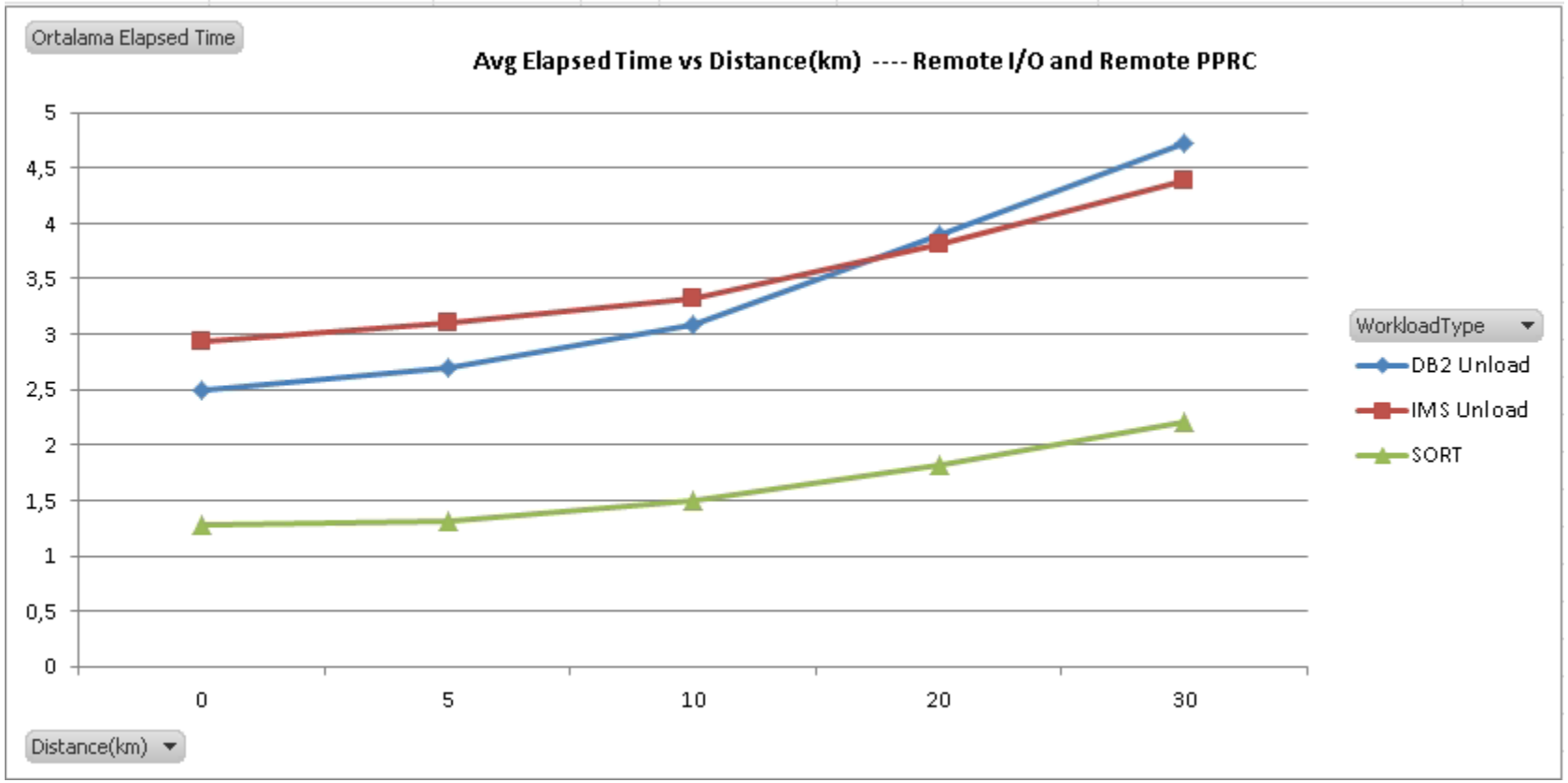
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Distance(km)	WorkloadType	Jobname	JobID	Run #	Date	Time Period	SCHENV	Elapsed Time	TCB Time	EXCPCount	CONN	TCB	SRB	CLOCK	ServiceUnit	SERCLA
2	0	SORT	ACTPLON	J0012612	1	05 AUG 2015	02.26.51 - 02.28.10	TESD	1.30	.05	13848	99527	551177	.01	13	889K	SYSSTC
3	0	SORT	ACTPLON	J0021122	2	05 AUG 2015	13.11.23 - 13.12.42	TESD	1.30	.05	13848	99122	551177	.01	13	926K	SYSSTC
4	0	SORT	ACTPLON	J0021150	3	05 AUG 2015	13.18.23 - 13.19.41	TESD	1.20	.05	13848	98975	551177	.01	12	903K	SYSSTC
5	0	SORT	ACTPLON	J0021344	4	05 AUG 2015	13.28.37 - 13.29.56	TESD	1.30	.05	13848	100K	551177	.01	13	960K	SYSSTC
6	0	SORT	ACTPLON	J0021448	5	05 AUG 2015	13.34.03 - 13.35.22	TESD	1.30	.05	13848	99834	551177	.01	13	1036K	SYSSTC
7	0	IMS Unload	IMSUNLOD	J0021529	1	05 AUG 2015	13.44.24 - 13.47.28	TESD	3.00	.05	186K	376K	551177	.02	30	14810K	SYSSTC
8	0	IMS Unload	IMSUNLOD	J0021739	2	05 AUG 2015	14.01.07 - 14.04.11	TESD	3.00	.03	186K	384K	551177	.02	30	14823K	SYSSTC
9	0	IMS Unload	IMSUNLOD	J0021979	3	05 AUG 2015	14.07.52 - 14.10.51	TESD	2.90	.03	186K	370K	551177	.02	29	14861K	SYSSTC
10	0	IMS Unload	IMSUNLOD	J0022095	4	05 AUG 2015	14.15.25 - 14.18.25	TESD	2.90	.03	186K	371K	551177	.02	29	14900K	SYSSTC
11	0	IMS Unload	IMSUNLOD	J0022202	5	05 AUG 2015	14.23.01 - 14.26.01	TESD	2.90	.03	186K	373K	551177	.02	29	14830K	SYSSTC
12	0	DB2 Unload	DB2UNLOD	J0022295	1	05 AUG 2015	14.29.35 - 14.32.10	TESD	2.50	2.12	950K	89484	551198	.03	25	12001K	SYSSTC
13	0	DB2 Unload	DB2UNLOD	J0022762	2	05 AUG 2015	14.45.00 - 14.47.32	TESD	2.50	2.13	950K	87410	551198	.03	25	12074K	SYSSTC
14	0	DB2 Unload	DB2UNLOD	J0022801	3	05 AUG 2015	14.49.21 - 14.51.52	TESD	2.50	2.11	950K	87782	551198	.03	25	11975K	SYSSTC
15	0	DB2 Unload	DB2UNLOD	J0023216	4	05 AUG 2015	15.17.15 - 15.19.44	TESD	2.40	2.11	950K	88139	551198	.03	24	11939K	SYSSTC
16	0	DB2 Unload	DB2UNLOD	J0023517	5	05 AUG 2015	15.46.58 - 15.46.58	TESD	2.50	2.11	950K	88202	551198	.03	25	11934K	SYSSTC
17	5	SORT	ACTPLON	J0012153	1	05 AUG 2015	00.49.51 - 00.51.20	TESD	1.30	.05	13848	101K	551177	.01	1.3	878K	SYSSTC
18	5	SORT	ACTPLON	J0012183	2	05 AUG 2015	00.53.22 - 00.54.47	TESD	1.40	.05	13848	103K	551177	.01	1.4	892K	SYSSTC
19	5	SORT	ACTPLON	J0012196	3	05 AUG 2015	00.56.21 - 00.57.43	TESD	1.30	.05	13848	100K	551177	.01	1.3	894K	SYSSTC
20	5	SORT	ACTPLON	J0012208	4	05 AUG 2015	00.59.13 - 01.00.36	TESD	1.30	.05	13848	101K	551177	.01	1.3	935K	SYSSTC
21	5	SORT	ACTPLON	J0012235	5	05 AUG 2015	01.03.56 - 01.05.19	TESD	1.30	.05	13848	101K	551177	.01	1.3	906K	SYSSTC
22	5	IMS Unload	IMSUNLOD	J0012257	1	05 AUG 2015	01.06.59 - 01.10.11	TESD	3.10	.05	186K	387K	551177	.02	3.1	14583K	SYSSTC
23	5	IMS Unload	IMSUNLOD	J0012293	2	05 AUG 2015	01.12.07 - 01.15.14	TESD	3.10	.03	186K	380K	551177	.02	3.1	14528K	SYSSTC
24	5	IMS Unload	IMSUNLOD	J0012310	3	05 AUG 2015	01.16.18 - 01.19.25	TESD	3.10	.03	186K	378K	551177	.02	3.1	14550K	SYSSTC
25	5	IMS Unload	IMSUNLOD	J0012334	4	05 AUG 2015	01.22.46 - 01.25.53	TESD	3.10	.03	186K	380K	551177	.02	3.0	14563K	SYSSTC
26	5	IMS Unload	IMSUNLOD	J0012369	5	05 AUG 2015	01.30.29 - 01.33.36	TESD	3.10	.03	186K	381K	551177	.02	3.1	14597K	SYSSTC
27	5	DB2 Unload	DB2UNLOD	J0012389	1	05 AUG 2015	01.35.35 - 01.38.23	TESD	2.70	2.10	950K	98018	551198	.03	2.7	11823K	SYSSTC
28	5	DB2 Unload	DB2UNLOD	J0012409	2	05 AUG 2015	01.39.33 - 01.42.19	TESD	2.70	2.09	950K	97514	551198	.03	2.7	11747K	SYSSTC
29	5	DB2 Unload	DB2UNLOD	J0012430	3	05 AUG 2015	01.44.26 - 01.47.12	TESD	2.70	2.09	950K	97477	551198	.03	2.7	11788K	SYSSTC
30	5	DB2 Unload	DB2UNLOD	J0012441	4	05 AUG 2015	01.47.59 - 01.50.43	TESD	2.70	2.10	950K	97895	551198	.03	2.7	11817K	SYSSTC
31	5	DB2 Unload	DB2UNLOD	J0012466	5	05 AUG 2015	01.51.31 - 01.54.16	TESD	2.70	2.10	950K	97443	551198	.03	27	11850K	SYSSTC
32	10	SORT	ACTPLON	J0011352	1	04 AUG 2015	22.18.24 - 22.19.59	TESD	1.50	.05	13848	108K	551177	.01	1.5	904K	SYSSTC
33	10	SORT	ACTPLON	J0011379	2	04 AUG 2015	22.23.42 - 22.25.14	TESD	1.50	.05	13848	108K	551177	.01	1.5	949K	SYSSTC
34	10	SORT	ACTPLON	J0011392	3	04 AUG 2015	22.29.48 - 22.31.20	TESD	1.50	.05	13848	109K	551177	.01	1.5	922K	SYSSTC
35	10	SORT	ACTPLON	J0011424	4	04 AUG 2015	22.34.28 - 22.35.59	TESD	1.50	.05	13848	108K	551177	.01	1.5	886K	SYSSTC

System TESD – DASD RespTime
Remote I/O – Remote PPRC

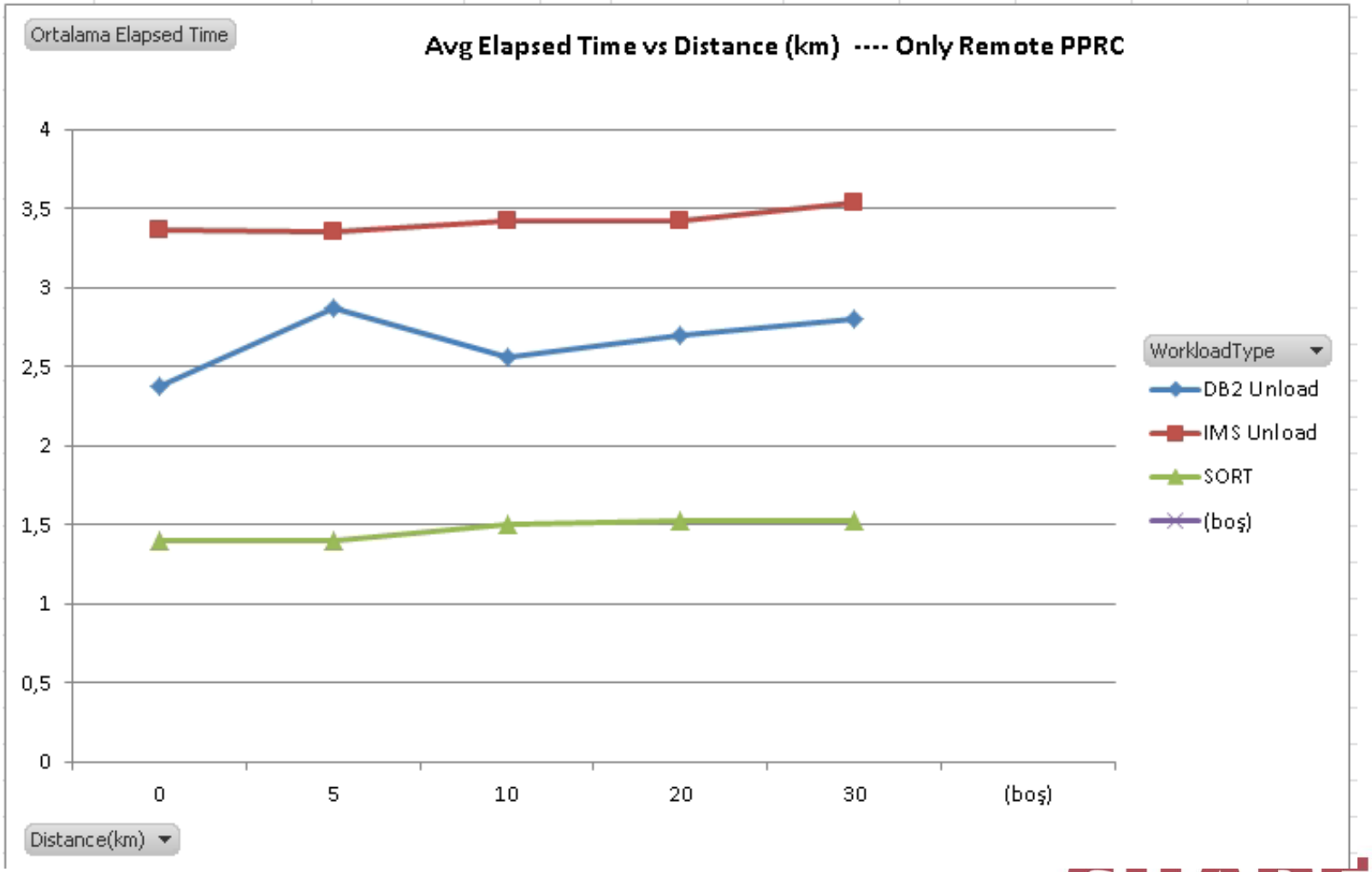


Main Component PEND –Time

Remote I/O – Remote PPRC Effect To Batch



Remote PPRC Effect To Batch



Running Workload – Remote CF,PPRC & I/O

We have run 3 IMS jobs that read with lock request (4000 CF locks/sec)

We have run sentetic CF request rate generator programs.

Mario Bezzi has written pgms ;
- that send sync request to his lock structure
that send sync request to his cache structure

From CF request perspective for primary effect «Request is Request»

- From CF request perspective for primary effect «Request is Request»
- Make service class SYSSTC - Remove the effect of CPU delay

Running Workload – Remote CF,PPRC & I/O

IMSLOCK1 job elapse time was increased from 2,6 min to 6,1 min

134 % INCREASE In Batch Elapse Time As A Result of Remote CF,I/O,PPRC

To See Remote IO s role , Run again With Local IO : Elapse Time 5,5

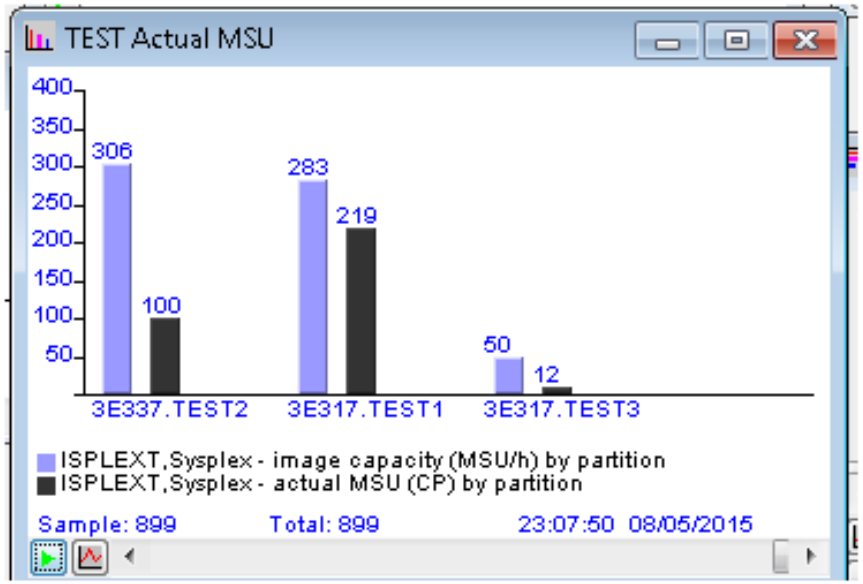
Increase From 2,6 min to 5,5 is MAINLY CF Effect

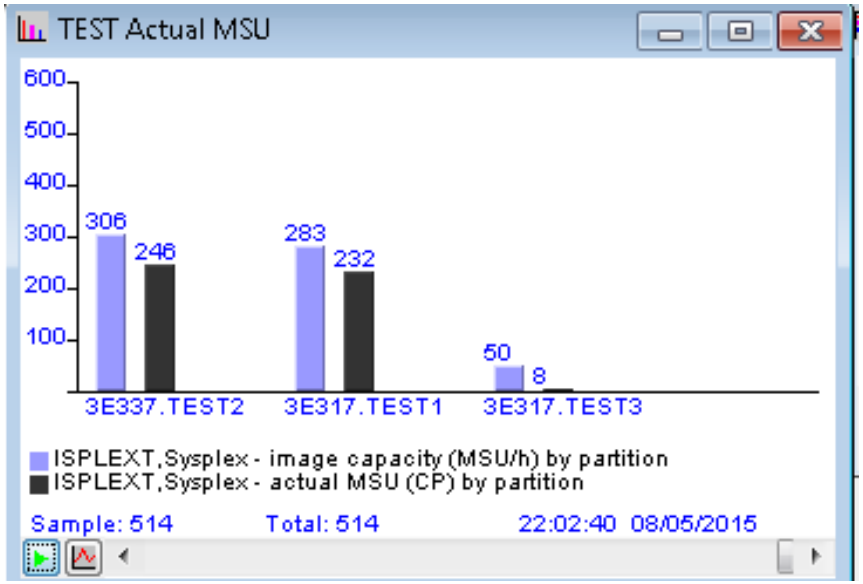
```
 Display  Filter  View  Print  Options  Search  Help
-------------------------------------------------------------------------------
SDSF DA TESD     (ALL)    PAG  0  CPU/L    20/ 15      LINE 1-12 (12)
COMMAND INPUT ===>                                     SCROLL ===> CSR
PREFIX=**  DEST=(ALL)  OWNER=IS93*  SORT=JOBNAME/A  SYSNAME=**
NP   JOBNAME  STEPNAME PROCSTEP TYPE JNUM  C POS DP REAL  SYSID   SIO   CPU%  PAGING ASID ASIDX OWNER   EXCP CNT   CPU TIME  SR
     CACHED01 STEP1            JOB  29618 A IN  E8   382 TESD    0.00  0.83  0.00  481 01E1  IS93111       14       1.74
     CACHEE01 STEP1            JOB  29619 A LO  FF   405 TESE    0.00  0.00  0.00  288 0120  IS93111       45       1.80 LW
     CLOCKD01 STEP1            JOB  29599 A IN  E8  18T  TESD    0.00  1.39  0.00  386 0182  IS93111       18       3.14
     CLOCKD02 STEP1            JOB  29600 A IN  E8  18T  TESD    0.00  0.83  0.00  694 02B6  IS93111       16       2.78
     CLOCKE01 STEP1            JOB  29611 A IN  EA  18T  TESE    0.00 11.46  0.00  548 0224  IS93111       48      49.99
     CLOCKE02 STEP1            JOB  29612 A IN  EA  18T  TESE    0.00 31.27  0.00  717 02CD  IS93111       52      54.85
     CLOCKE03 STEP1            JOB  29613 A IN  EA  18T  TESE    0.00 31.74  0.00  459 01CB  IS93111       47      55.88
     IMSLOCK1 OKU      DISPLAY JOB  29625 A NS  FE   460 TESD  439.47  1.39  0.00  394 018A  IS93081     2832       0.20
     IMSLOCK2 OKU      DISPLAY JOB  29623 A NS  FE   461 TESD  439.47  1.67  0.00  184 00B8  IS93081    11492       0.79
     IMSLOCK3 OKU      DISPLAY JOB  29624 A NS  FE   459 TESD  445.41  1.67  0.00  292 0124  IS93081     7534       0.53
     IS93081  IKJSYS   IPZ502  TSU  28946   LO  FF 3,116 TESF    0.00  0.00  0.00  132 0084  IS93081    70038      15.93 TI
     IS93111  IKJMVS   IPZ501  TSU  29503   IN  E8 3,001 TESD    0.00  0.83  0.00  419 01A3  IS93111     1682       0.60
```

This Does Not Include Secondary Effect : Contentions Between Workloads

Running Workload – Remote CF,PPRC & I/O

Sentetic CF Workload CPU Cost - 200- 380 K CF request /sec





Running Workload – Remote CF,PPRC & I/O

Async CF Request Rate CPU Cost Is Charged To XCFAS (as well)

XCFAS Cpu was increased from 1,5 APPL (2,2 MSU) to 12,9 APPL(19,5 MSU)

```
                        RMF V1R13  Processor Usage                  Line 1 of 41
Command ===> _                                                    Scroll ===> CSR

Samples: 10       System: TESD  Date: 08/05/15  Time: 23.19.10  Range: 10     Sec

                 Service     --- Time on CP % ---    ----- EAppl % -----
Jobname   CX   Class        Total     AAP     IIP        CP     AAP     IIP

XCFAS     S    SYSTEM        12.9     0.0     0.0      12.9             0.0
IMT1DLI   S    STCIMSHI       7.1     0.0     0.0       7.1             0.0
RMF       S    SYSSTC         3.4     0.0     0.0       3.4             0.0
IMSLOCK1  B    SYSSTC         3.0     0.0     0.0       3.0             0.0
IMSLOCK2  B    SYSSTC         2.9     0.0     0.0       2.9             0.0
IMSLOCK3  B    SYSSTC         2.9     0.0     0.0       2.9             0.0
CLOCKD01  B    BATCHHI        2.1     0.0     0.0       2.1             0.0
CLOCKD02  B    BATCHHI        2.1     0.0     0.0       2.1             0.0
RMFGAT    SO   SYSSTC         2.0     0.0     0.0       2.0             0.0
CACHED01  B    BATCHLO        1.8     0.0     0.0       1.8             0.0
UA1BMSTR  S    DB2HI          1.5     0.0     0.0       1.5             0.0
AT1BMSTR  S    DB2HI          1.5     0.0     0.0       1.5             0.0
PF1BMSTR  S    DB2HI          1.5     0.0     0.0       1.5             0.0
DV1BMSTR  S    DB2HI          1.5     0.0     0.0       1.5             0.0
TE1BMSTR  S    DB2HI          1.5     0.0     0.0       1.5             0.0
JES2      S    SYSSTC         1.2     0.0     0.0       1.2             0.0
CDCTEST   SO   STCHI          1.2     0.0     0.0       1.2             0.0
IMT1IRLM  S    SYSSTC         0.9     0.0     0.0       0.9             0.0
IMSUGONF  B    BATCHLO        0.8     0.0     0.0       0.8             0.0
CATALOG   S    SYSTEM         0.6     0.0     0.0       0.6             0.0
GRS       S    SYSTEM         0.5     0.0     0.0       0.5             0.0
GPMSERVE  SO   SYSSTC         0.4     0.0     0.0       0.4             0.0
KODGONDR  BO   ZOMBI          0.3     0.0     0.0       0.3             0.0
WLM       S    SYSTEM         0.2     0.0     0.0       0.2             0.0
OMSDTEMS  SO   OMMVS          0.2     0.0     0.0       0.2             0.0
WSDMGR    SO   SYSSTC         0.0     0.0     0.0       0.0             0.1
OMSDO2    S    OMMVS          0.1     0.0     0.0       0.1             0.0
TSS15     S    SYSSTC         0.1     0.0     0.0       0.1             0.0
SMS       S    SYSSTC         0.1     0.0     0.0       0.1             0.0
TCPIP     SO   SYSSTC         0.1     0.0     0.0       0.1             0.0
IMU1IRLM  S    SYSSTC         0.1     0.0     0.0       0.1             0.0
HSMDFDSS  B    BATCHHI        0.1     0.0     0.0       0.1             0.0
IMT1MNTR  B    STCIMS         0.1     0.0     0.0       0.1             0.0
HWSU1A    SO   SYSSTC         0.1     0.0     0.0       0.1             0.0
DV1BIRLM  S    SYSSTC         0.1     0.0     0.0       0.1             0.0
PF1BIRLM  S    SYSSTC         0.1     0.0     0.0       0.1             0.0
UA1BIRLM  S    SYSSTC         0.1     0.0     0.0       0.1             0.0
DV1BDBM1  S    DB2HI          0.1     0.0     0.0       0.1             0.0
WSDMGRS   SO   SYSSTC         0.0     0.0     0.0       0.0             0.1
```

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And my amazing new MVS System programmers in my Team…

THANK YOU

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