IBM Systems and Technology Group Technical Conference

Los Angeles, California
May 12-16, 2008

Sysplex Analysis using zCP3000

Session zZS03

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Agenda

- What is Sysplex?
- What questions are you trying to answer?
- zCP3000 overview
- zCP3000 sysplex support
  - Performance Analysis (PA) mode
  - Capacity Planning (CP) mode
- References
  - Where to get more help
  - Where to get zCP3000 and other CPS Tools

What is a Parallel Sysplex?

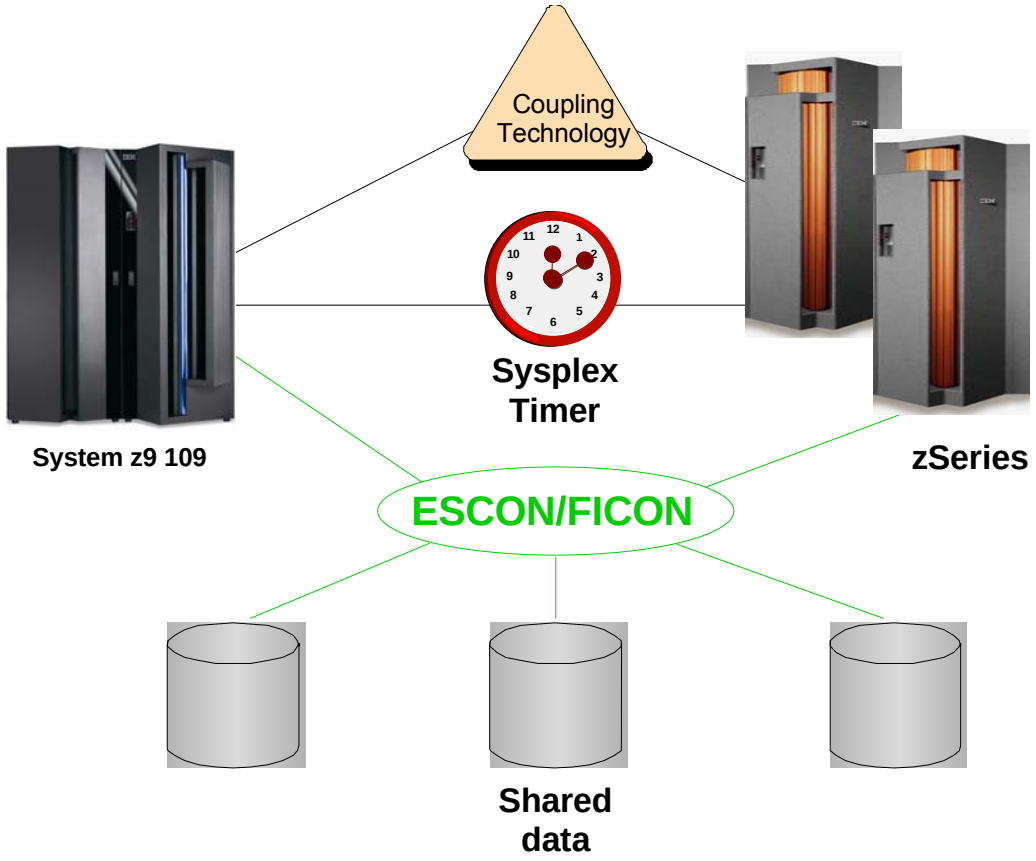
- Up to 32 z/OS logically functioning as one
- Transparent supporting infrastructure
- Hardware and software components

Parallel Sysplex Benefits

- Continuous availability
- Flexible growth
- High-performance shared data across systems
- **Potential software pricing benefit**

Parallel Sysplex – What is it ?

- Hardware
  - Timer
  - I/O Connectivity
  - Coupling Facility
- Software
  - XCF/XES
  - WLM
- µ-code (Microcode)
  - CFCC
  - Processor µ-code



Sysplex Questions

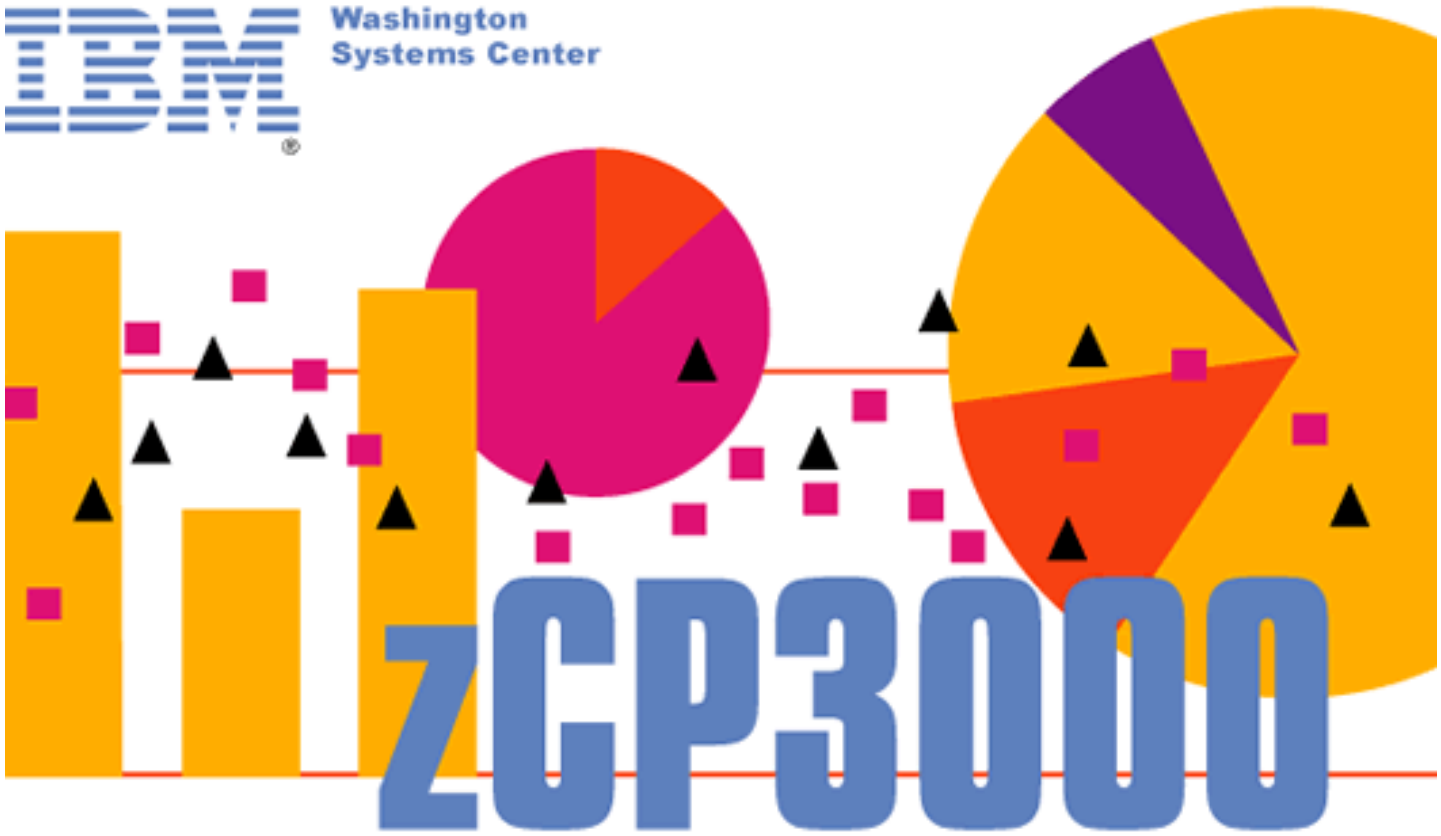
- Mainframe is being upgraded…
  - Upgrade CF too?
  - Upgrade links?

No more than one generation difference within sysplex

- Effect of distance on performance
- Where does it hurt?
  - General Health
  - Lock Contention
  - Reasonable service times
  - CF and link utilization

Depends on Link speed, distance, structure type, duplexing

Probably not the answer you think it is



Performance Analysis and Capacity Planning

zCP3000 Highlights

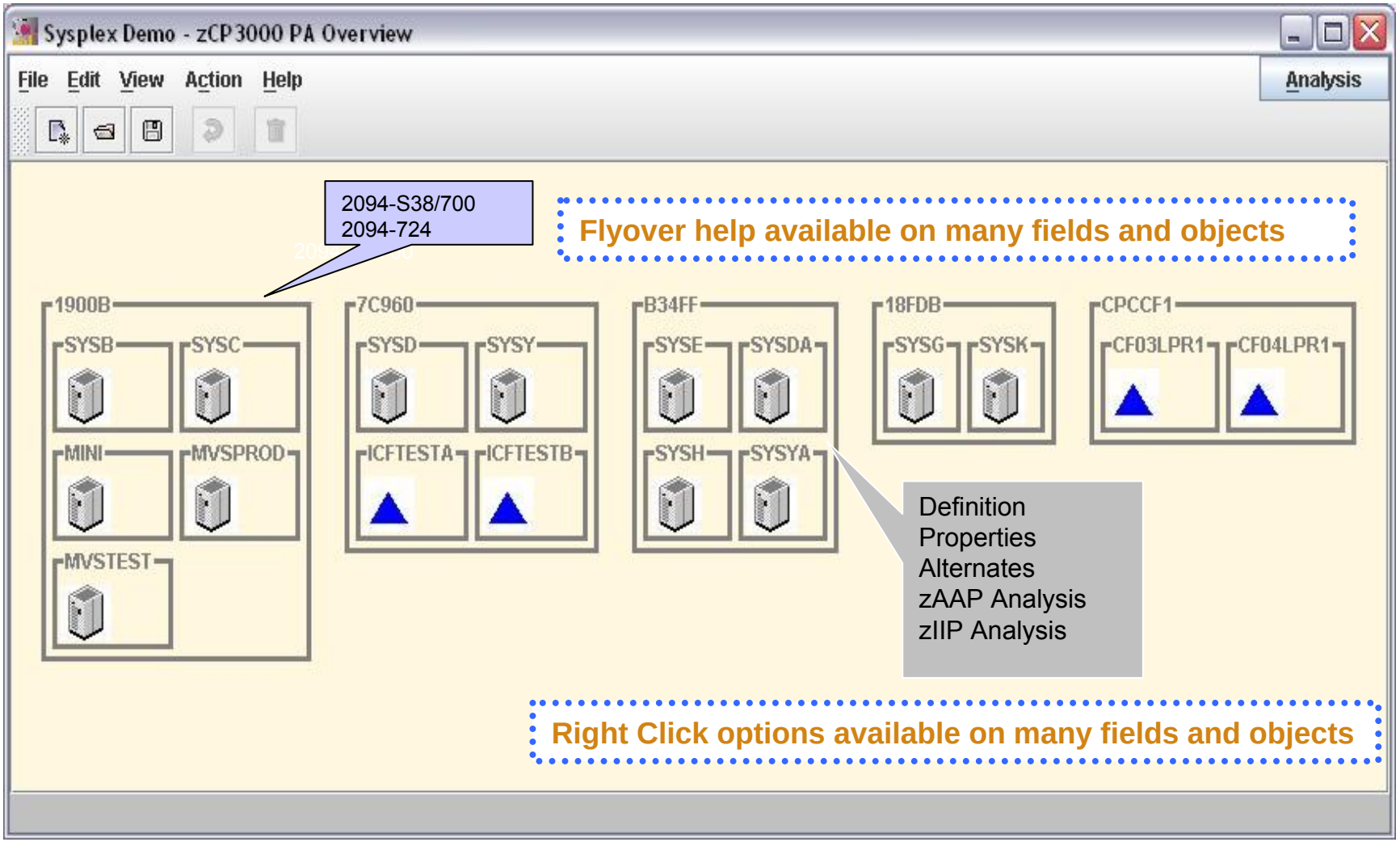
- Customer generated input from SMF and VM Monitor
- Automated graph and report generation
- Customizable HTML/JPG based output
- z/OS, z/VM, LPAR, Specialty engines
- Parallel Sysplex and FICON
- IBM System z, IBM zSeries and IBM S/390 processors
- zPCR based processor power numbers

- For IBM Field, IBM Techline, and IBM Business Partners, to assist in selling and successfully installing IBM System z processors.

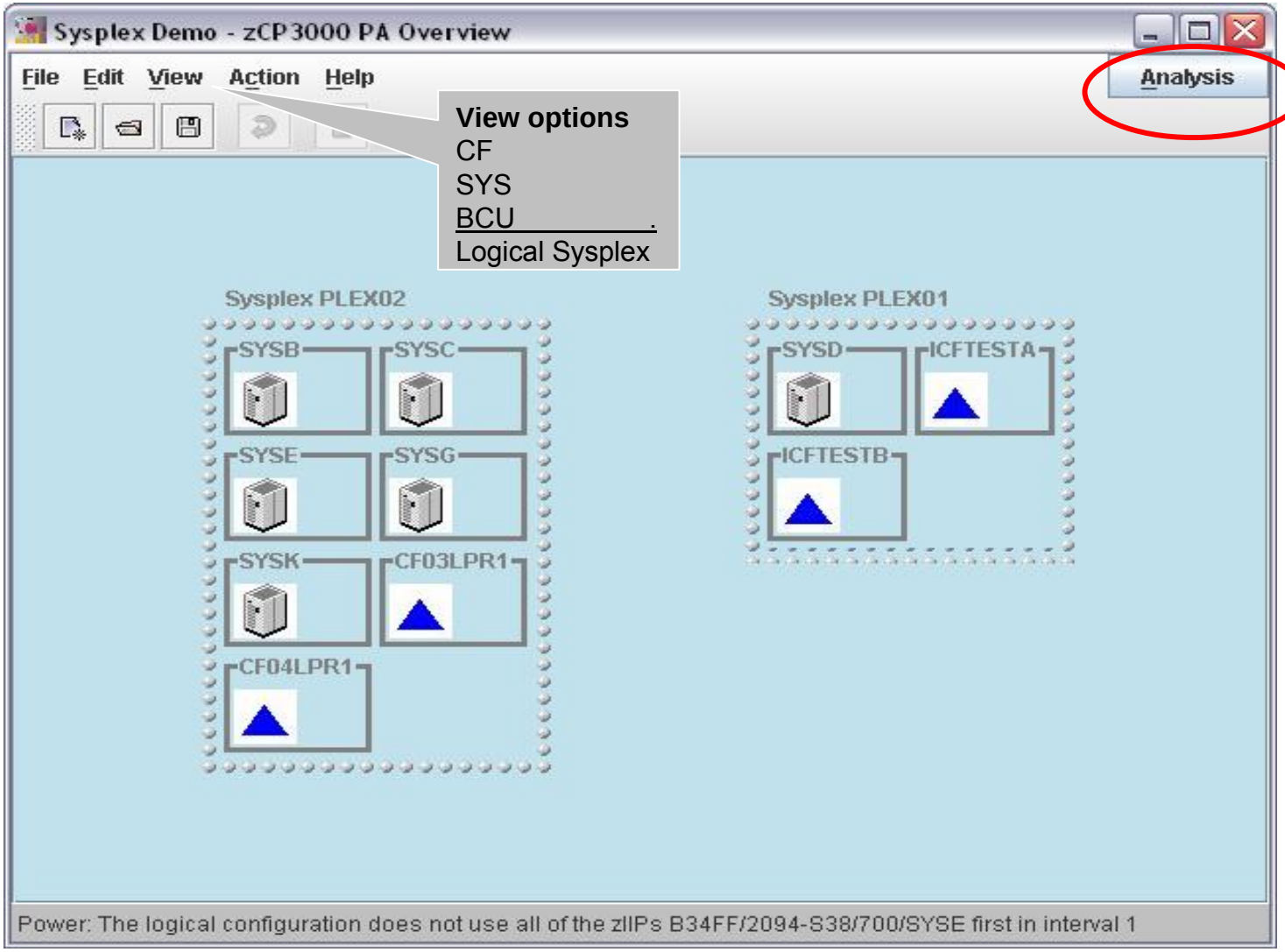
- Thursday May 15 STG

zTL02 : zCP3000 What's New
zTL52 : zCP3000 Demo/Lab

zCP3000 Main View



Logical Sysplex View → just the sysplex components

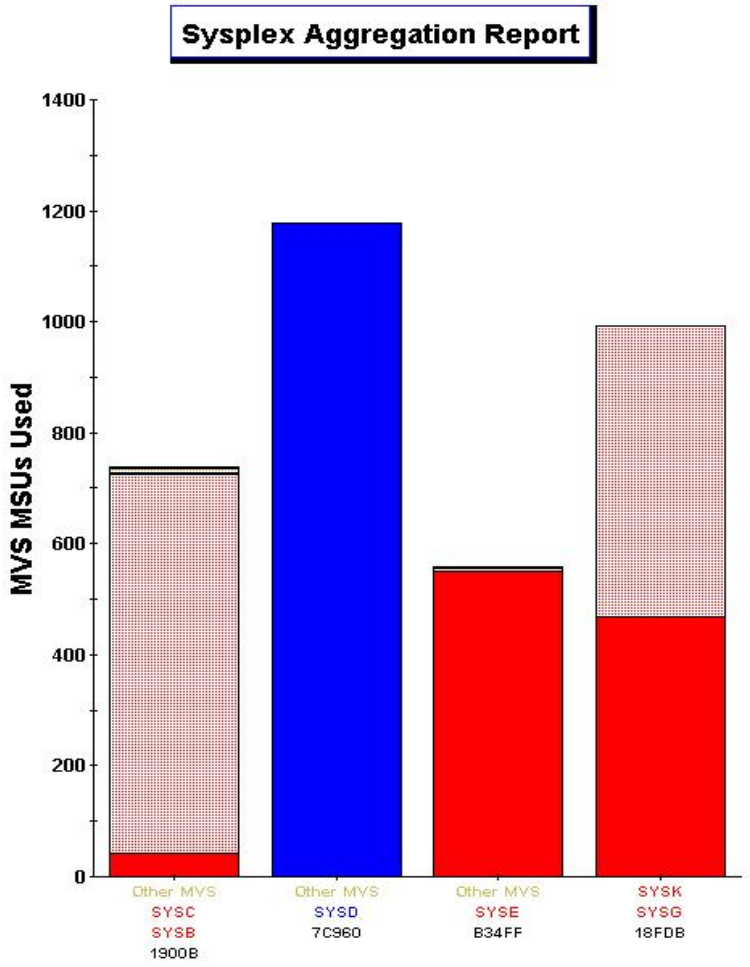


Graphs And Analysis

Sysplex Aggregation

Sysplex Aggregation Report by Sysid : zCP3000 Graph and Text: PLEX1005

File Action



Sysplex aggregation "provides the ability to pay for software on more than one [CEC] as if the software was executing on a single large [CEC] of the same capacity as the aggregate capacity of the individual [CECs]" (RedPaper REDP-3967 "z/OS Systems Programmers Guide to: Sysplex Aggregation").

The **"Sysplex Aggregation Report"** sums the MSUs used by each z/OS system in each CEC included in the study, to help determine whether the site might meet the 50% part of Sysplex Aggregation Operational Requirements. This report does NOT replace the report generated by the PLEXCALC tool, because it is generally looking at much more than a 40 hour production workweek, but it is a quick way to estimate whether the customer installation may be eligible for sysplex aggregation pricing.

The tables below list the total z/OS MSUs used, and the proportion of those that are sysplex members. In the graph and in the table, z/OS systems that are in the same sysplex are the same color, while z/OS systems that are not sysplex members are a gold color. Highlighted in bold type are the system members of a sysplex which accounts for at least 50% of the z/OS based MSUs consumed on that CEC. This sysplex is considered the **PrimaryPlex** for that CEC.

CEC	SYSID	SCP	Sysplex	Avg MSU used	% of MVS-based MSUs
1900B	**SYSB**	**z/OS**	**PLEX02**	**42.27**	**5.7%**
1900B	**SYSC**	**z/OS**	**PLEX02**	**683.44**	**92.5%**
1900B	MINI	z/OS		2.53	0.3%
1900B	MVSPROD	z/OS		6.65	0.9%
1900B	MVSTEST	z/OS		4.11	0.6%
1900B	Total	MVS		739.00	100.0%

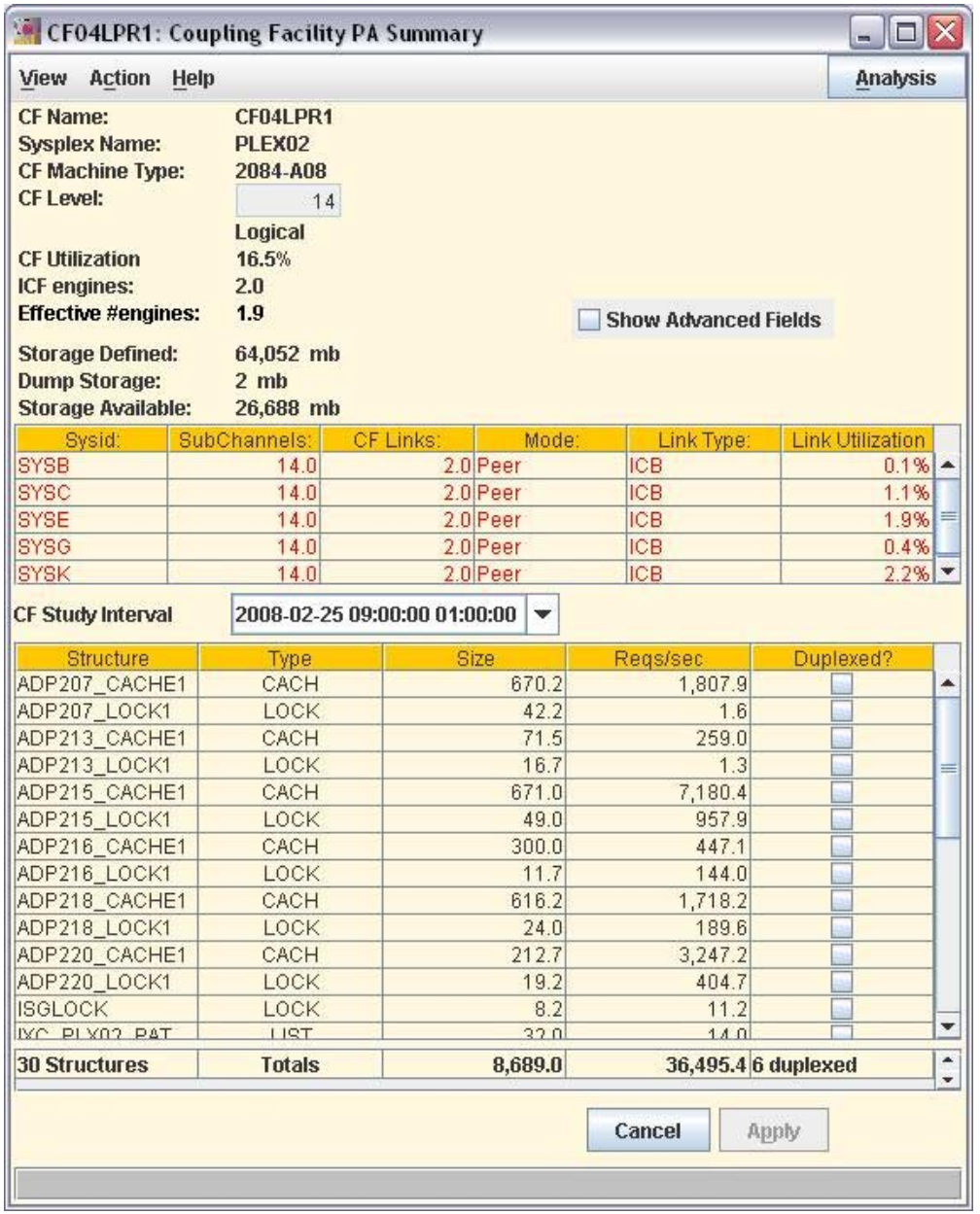
CEC	SYSID	SCP	Sysplex	Avg MSU used	% of MVS-based MSUs
7C960	**SYSD**	**z/OS**	**PLEX01**	**1,177.59**	**100.0%**
7C960	SYSY	z/OS		0.00	0.0%
7C960	Total	MVS		1,177.59	100.0%

Coupling Facility Summary

CF Information

CF Link Table

Structure Table

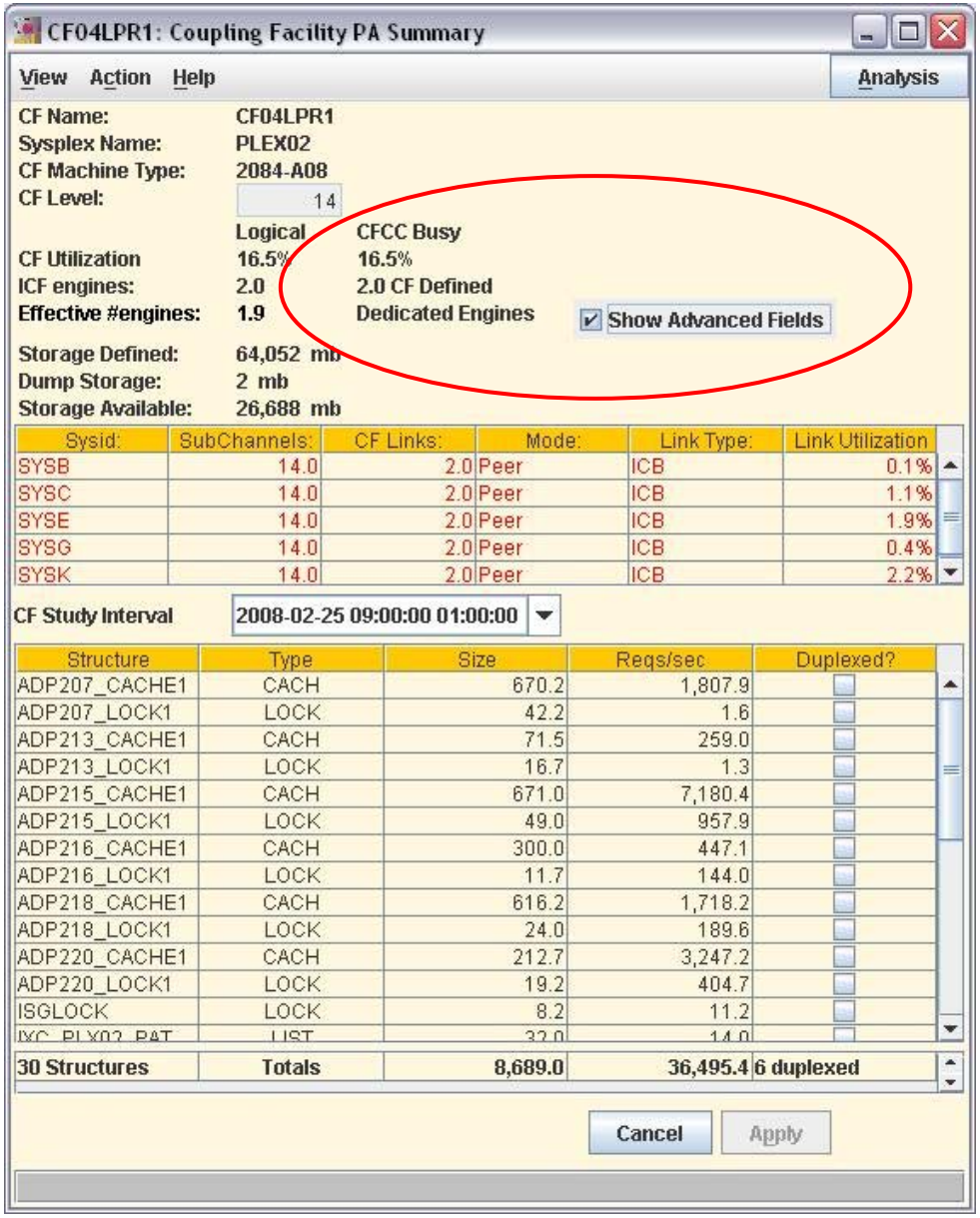


Coupling Facility Summary

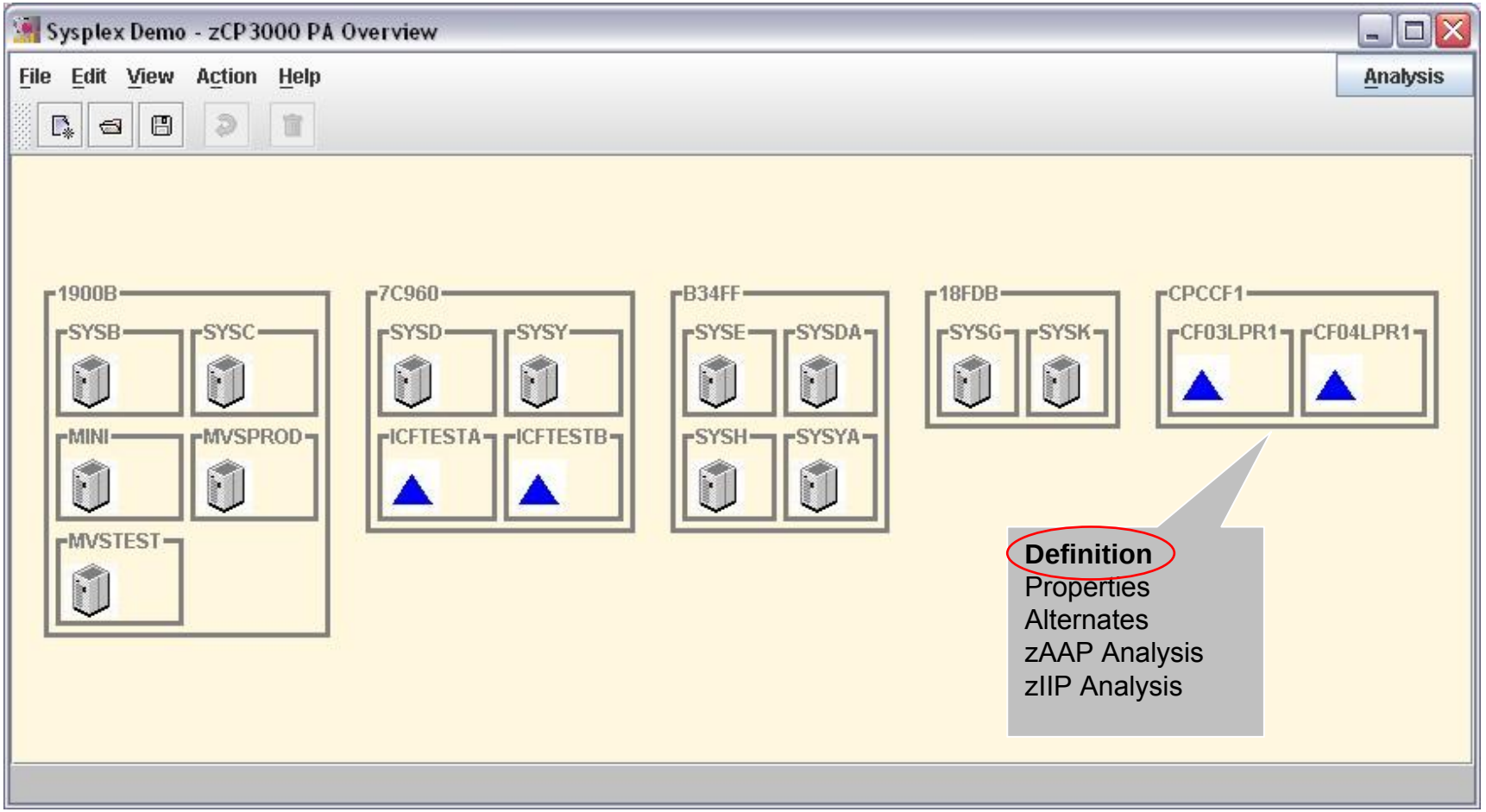
Partition Utilization
Vs
CFCC Utilization

1.9 Dedicated Engines???

Check/Correct the CEC definition

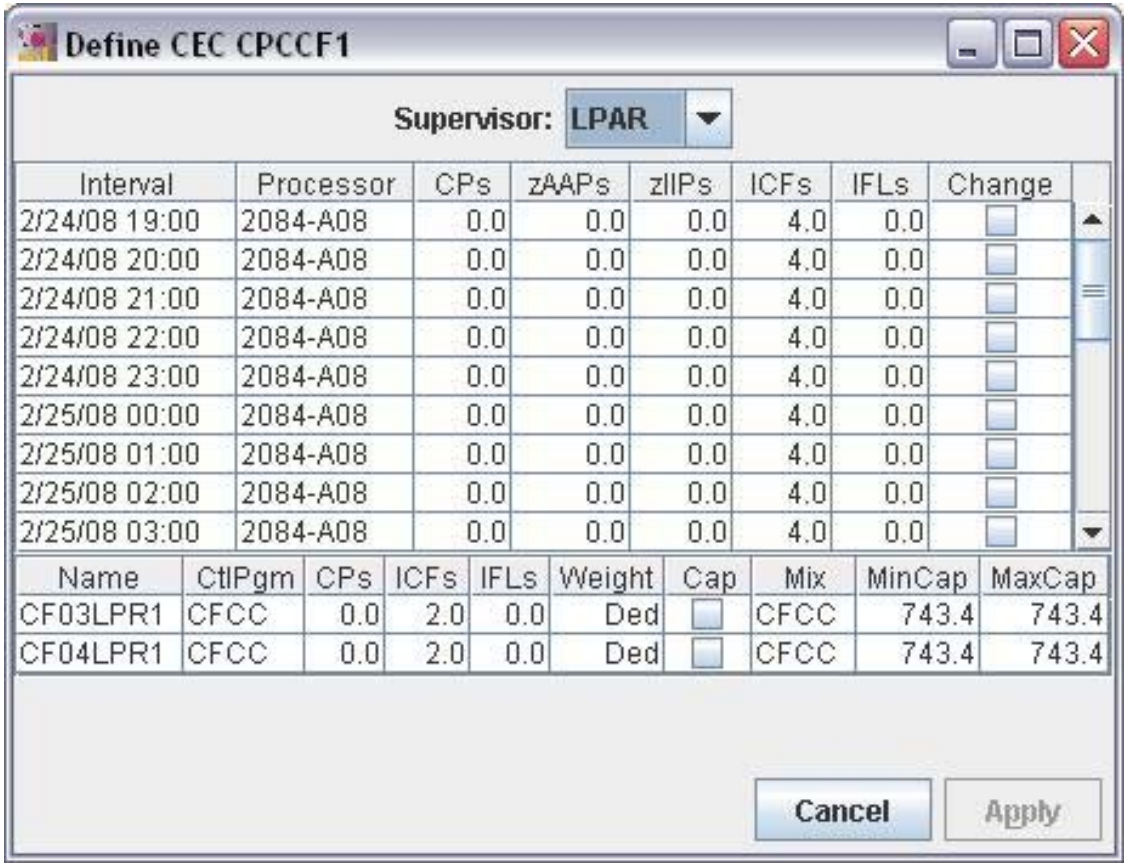


Change the CEC Definition



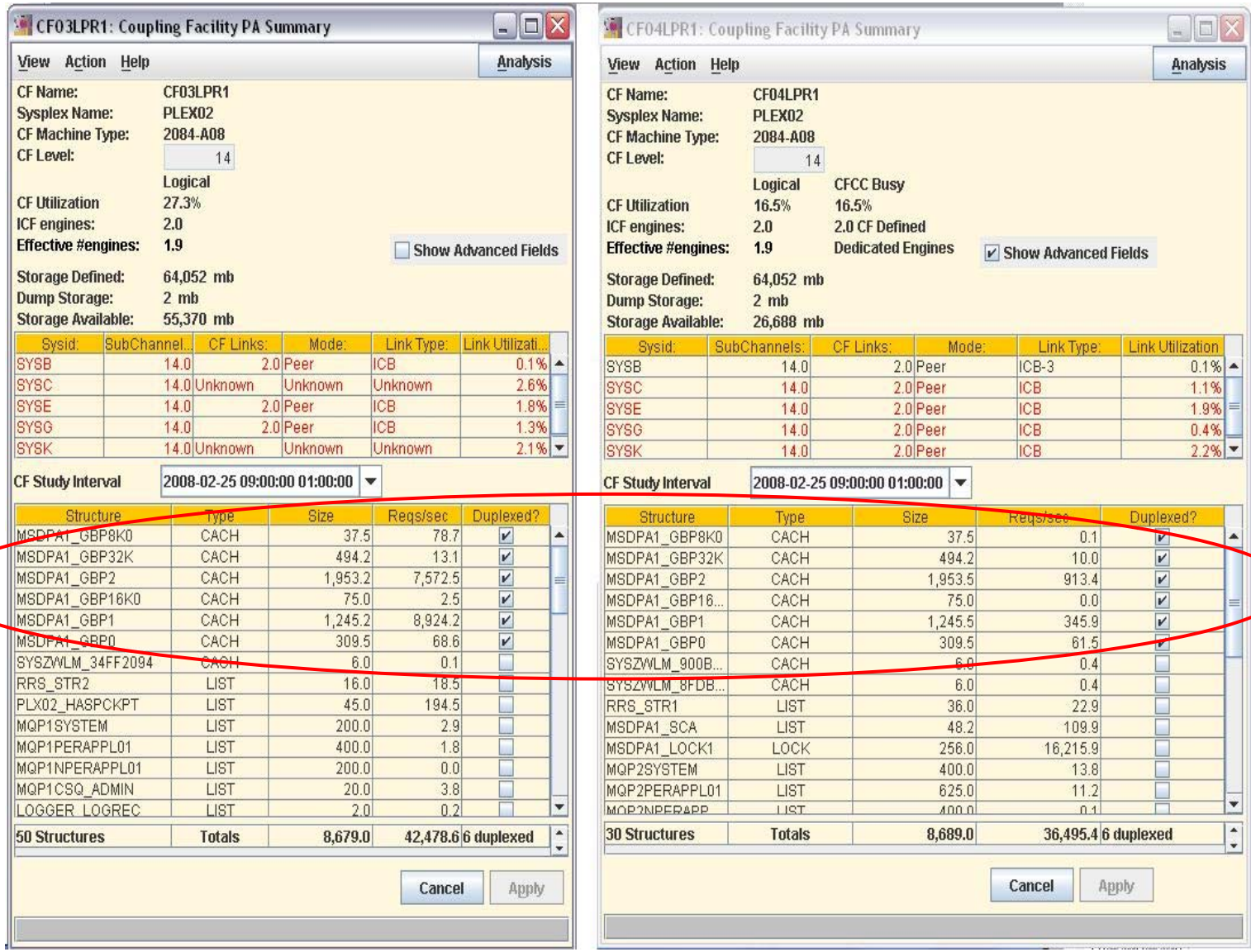
CEC Definition

A generated CEC is created when we know it must exist, but we don't have any SMF from it



View CFs Side by Side

Duplexed structures but no peer CF.



CF03LPR1: Coupling Facility PA Summary

View Action Help — Analysis

CF Name: CF03LPR1
Sysplex Name: PLEX02
CF Machine Type: 2084-A08
CF Level: 14
Logical
CF Utilization 27.3%
ICF engines: 2.0
Effective #engines: 1.9
Show Advanced Fields
Storage Defined: 64,052 mb
Dump Storage: 2 mb
Storage Available: 55,370 mb

Sysid:	SubChannel...	CF Links:	Mode:	Link Type:	Link Utilizati...
SYSB	14.0	2.0	Peer	ICB	0.1%
SYSC	14.0	Unknown	Unknown	Unknown	2.6%
SYSE	14.0	2.0	Peer	ICB	1.8%
SYSG	14.0	2.0	Peer	ICB	1.3%
SYSK	14.0	Unknown	Unknown	Unknown	2.1%

CF Study Interval 2008-02-25 09:00:00 01:00:00

Structure	Type	Size	Reqs/sec	Duplexed?
MSDPA1_GBP8K0	CACH	37.5	78.7	☑
MSDPA1_GBP32K	CACH	494.2	13.1	☑
MSDPA1_GBP2	CACH	1,953.2	7,572.5	☑
MSDPA1_GBP16K0	CACH	75.0	2.5	☑
MSDPA1_GBP1	CACH	1,245.2	8,924.2	☑
MSDPA1_GBP0	CACH	309.5	68.6	☑
SYSZWLM_34FF2094	CACH	6.0	0.1	☐
RRS_STR2	LIST	16.0	18.5	☐
PLX02_HASPCKPT	LIST	45.0	194.5	☐
MQP1SYSTEM	LIST	200.0	2.9	☐
MQP1PERAPPL01	LIST	400.0	1.8	☐
MQP1NPERAPPL01	LIST	200.0	0.0	☐
MQP1CSQ_ADMIN	LIST	20.0	3.8	☐
LOGGER_LOGREC	LIST	2.0	0.2	☐
50 Structures	Totals	8,679.0	42,478.6	6 duplexed

Cancel Apply

CF04LPR1: Coupling Facility PA Summary

View Action Help — Analysis

CF Name: CF04LPR1
Sysplex Name: PLEX02
CF Machine Type: 2084-A08
CF Level: 14
Logical CFCC Busy
CF Utilization 16.5% 16.5%
ICF engines: 2.0 2.0 CF Defined
Effective #engines: 1.9 Dedicated Engines
Show Advanced Fields
Storage Defined: 64,052 mb
Dump Storage: 2 mb
Storage Available: 26,688 mb

Sysid:	SubChannels:	CF Links:	Mode:	Link Type:	Link Utilization
SYSB	14.0	2.0	Peer	ICB-3	0.1%
SYSC	14.0	2.0	Peer	ICB	1.1%
SYSE	14.0	2.0	Peer	ICB	1.9%
SYSG	14.0	2.0	Peer	ICB	0.4%
SYSK	14.0	2.0	Peer	ICB	2.2%

CF Study Interval 2008-02-25 09:00:00 01:00:00

Structure	Type	Size	Reqs/sec	Duplexed?
MSDPA1_GBP8K0	CACH	37.5	0.1	☑
MSDPA1_GBP32K	CACH	494.2	10.0	☑
MSDPA1_GBP2	CACH	1,953.5	913.4	☑
MSDPA1_GBP16...	CACH	75.0	0.0	☑
MSDPA1_GBP1	CACH	1,245.5	345.9	☑
MSDPA1_GBP0	CACH	309.5	61.5	☑
SYSZWLM_900B...	CACH	6.0	0.4	☐
SYSZWLM_8FDB...	CACH	6.0	0.4	☐
RRS_STR1	LIST	36.0	22.9	☐
MSDPA1_SCA	LIST	48.2	109.9	☐
MSDPA1_LOCK1	LOCK	256.0	16,215.9	☐
MQP2SYSTEM	LIST	400.0	13.8	☐
MQP2PERAPPL01	LIST	625.0	11.2	☐
MQP2NPERAPP...	LIST	400.0	0.1	☐
30 Structures	Totals	8,689.0	36,495.4	6 duplexed

Cancel Apply

Coupling Facility Summary (RCF1 testcase)

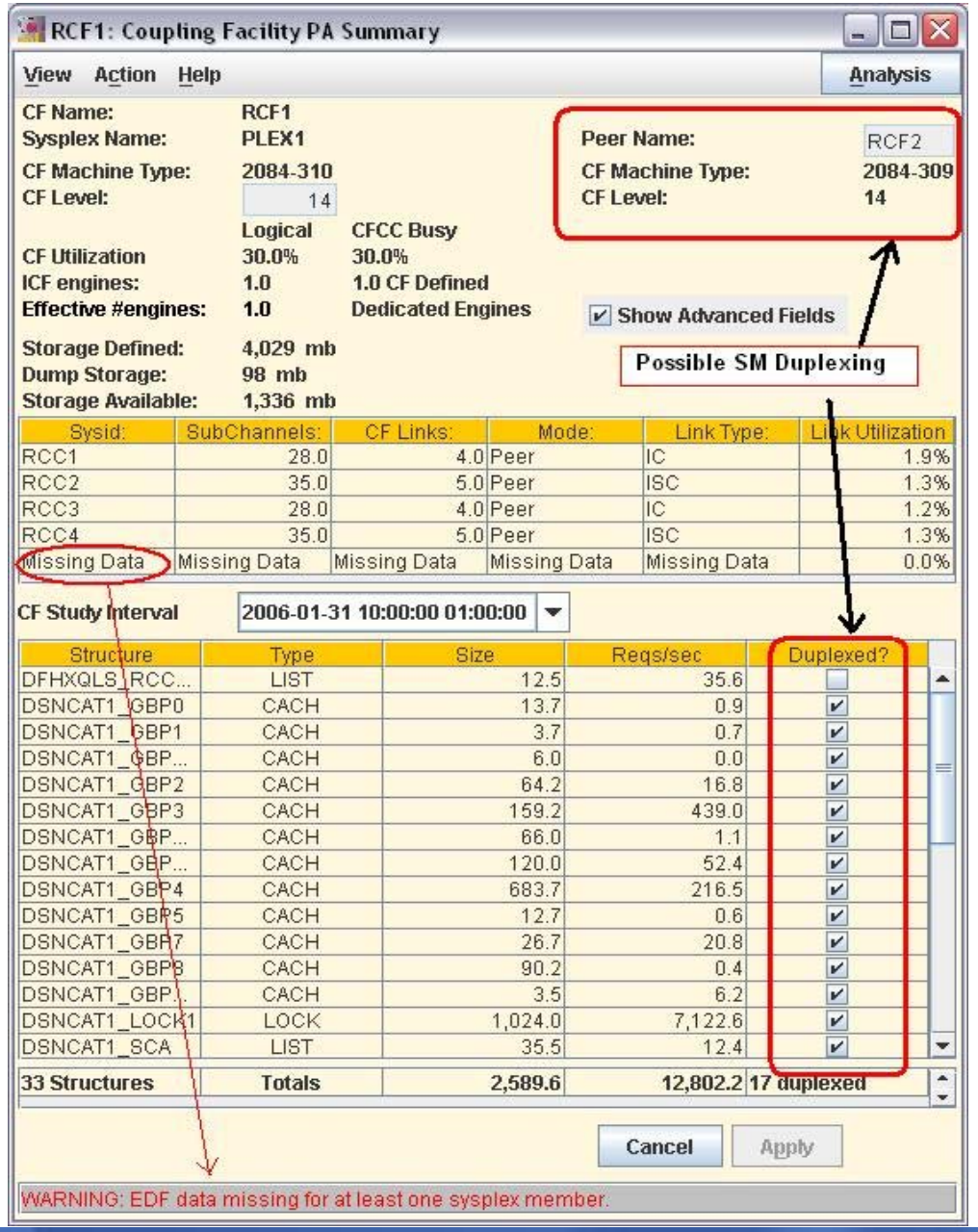
System Managed Duplexing

Or is it

User Managed Duplexing?

EDF missing

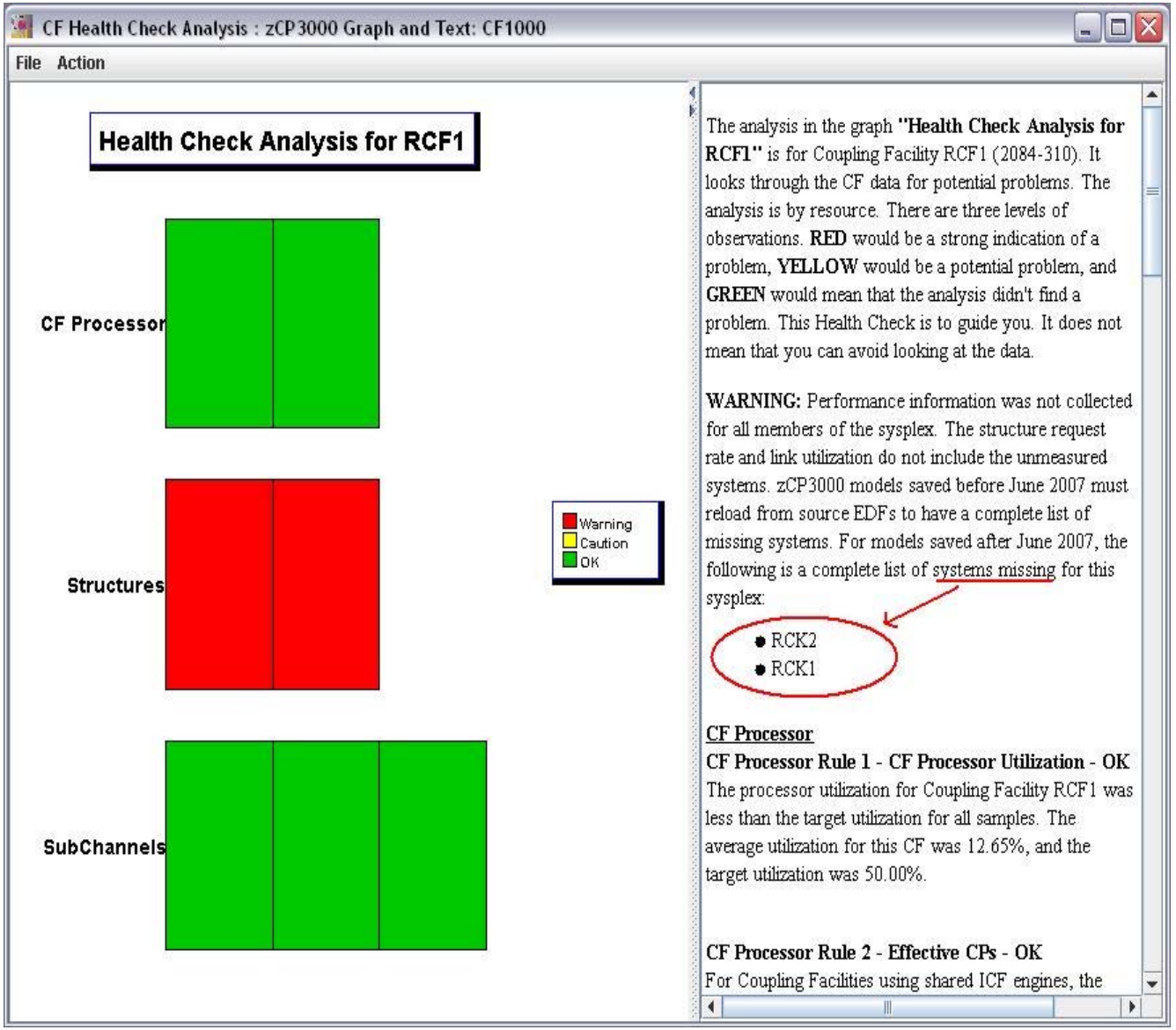
Incomplete Input Data
- does it matter?



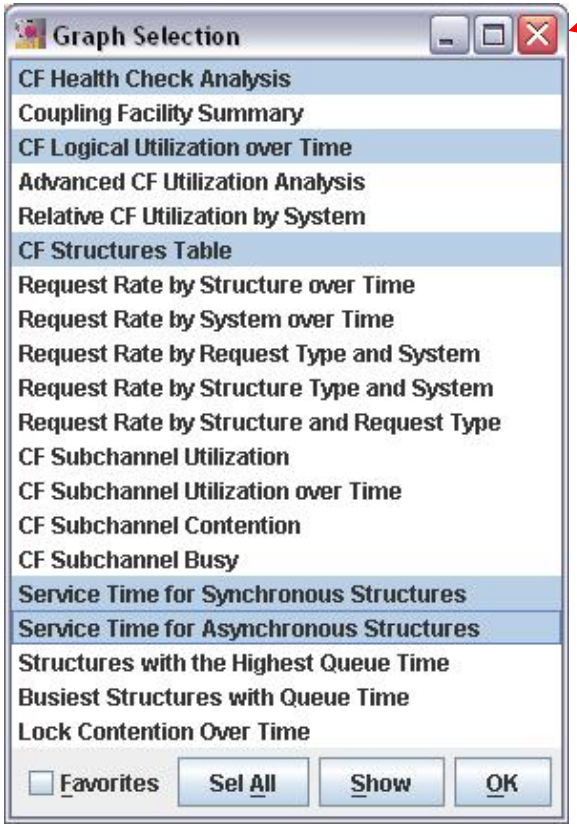
Coupling Facility Summary (RCF1 testcase)

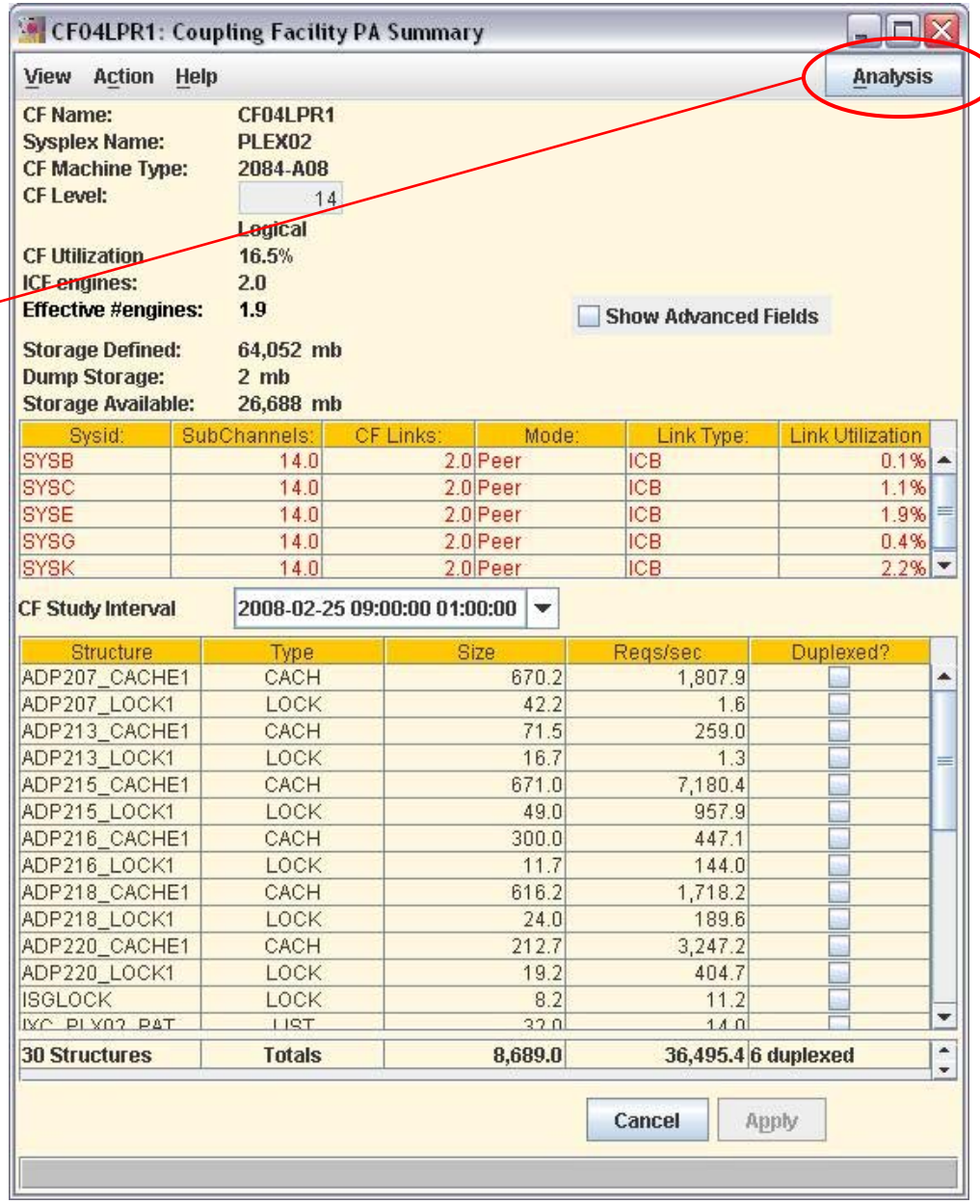
Missing EDFs listed on

- CF Health Check
- CF Summary Rpt



Coupling Facility Summary Graphs



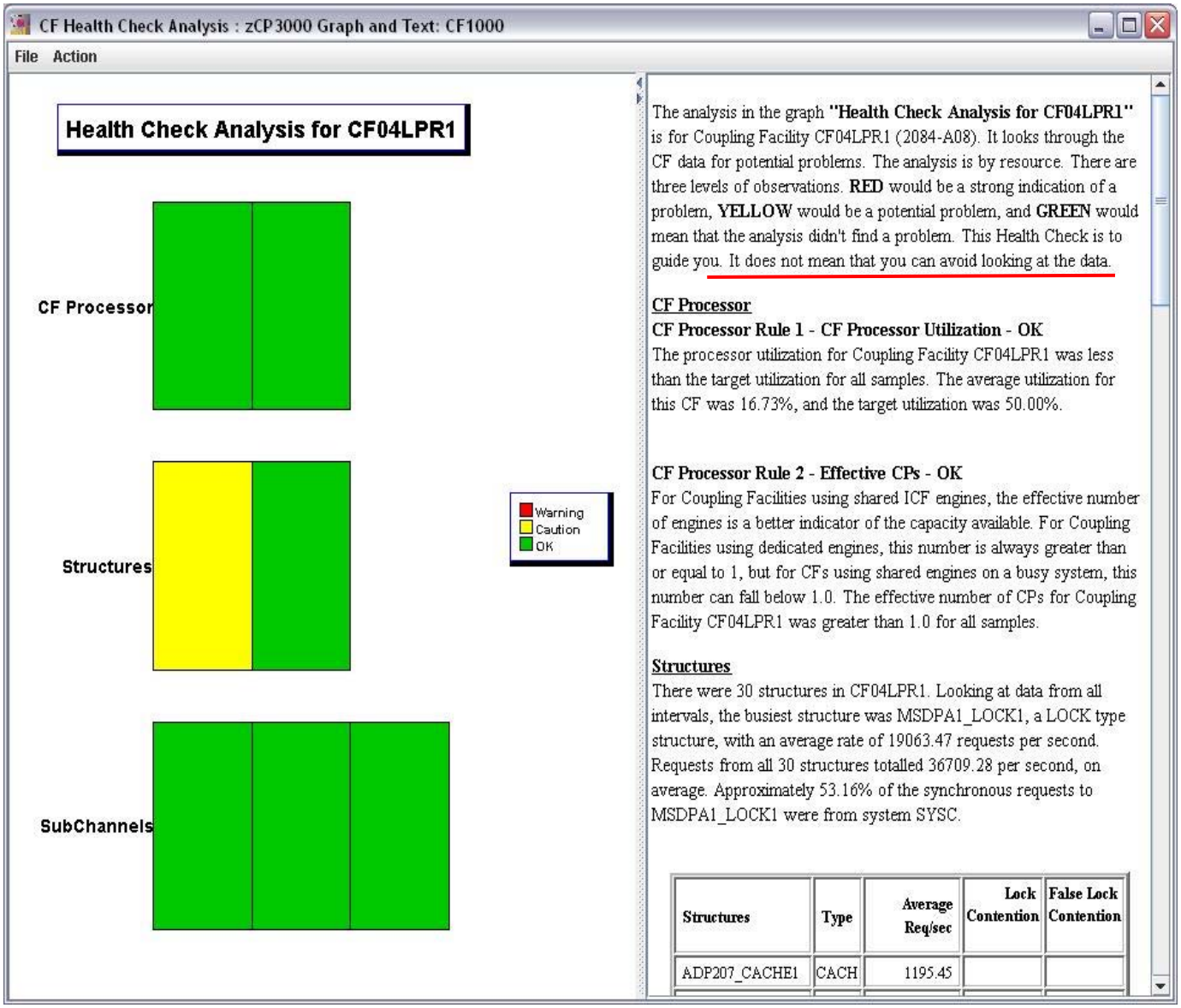


CF Health Check

At a glance

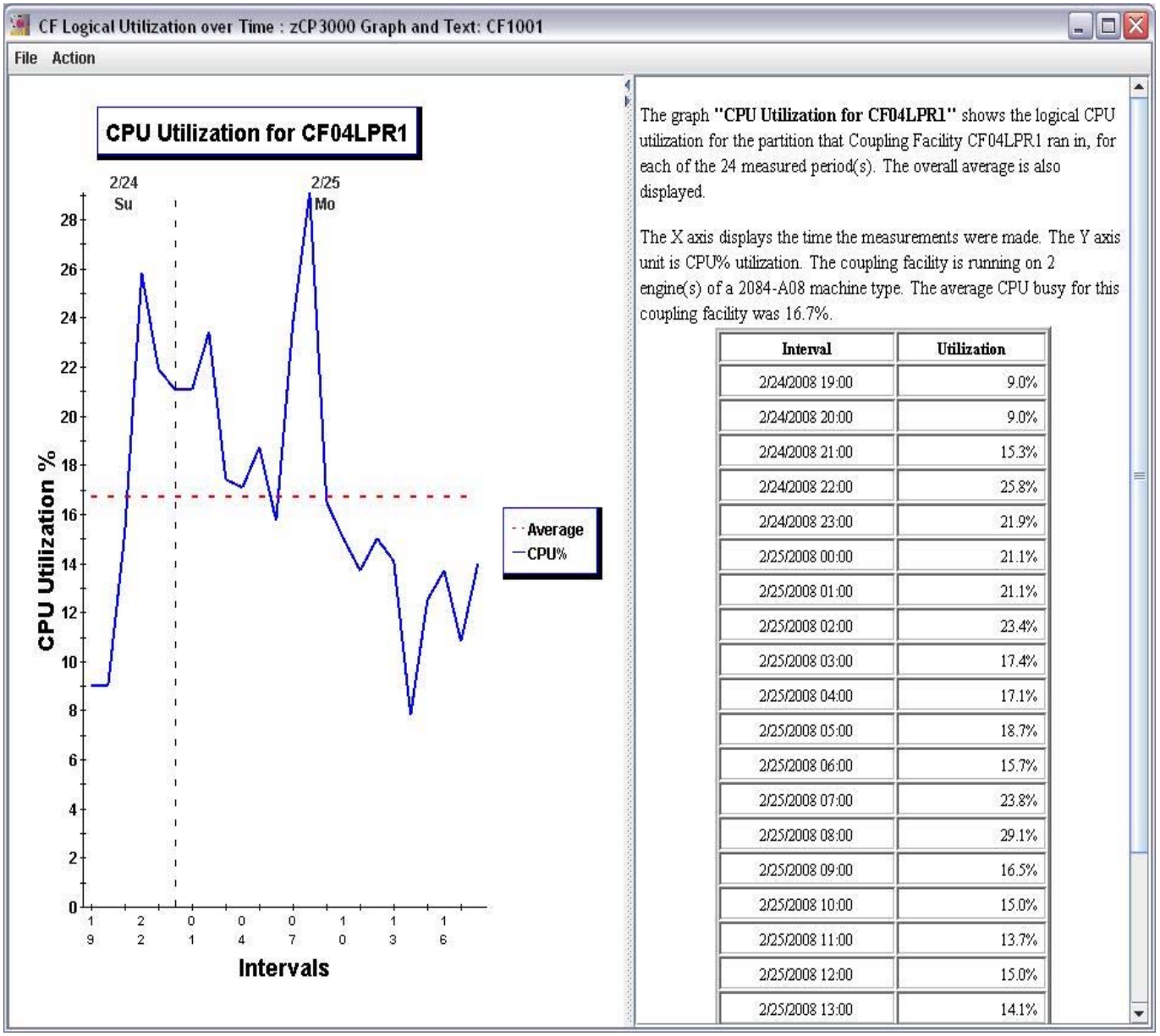
BUT

"it does not mean that you can avoid looking at the data."



CF Utilization

Logical Partition Utilization

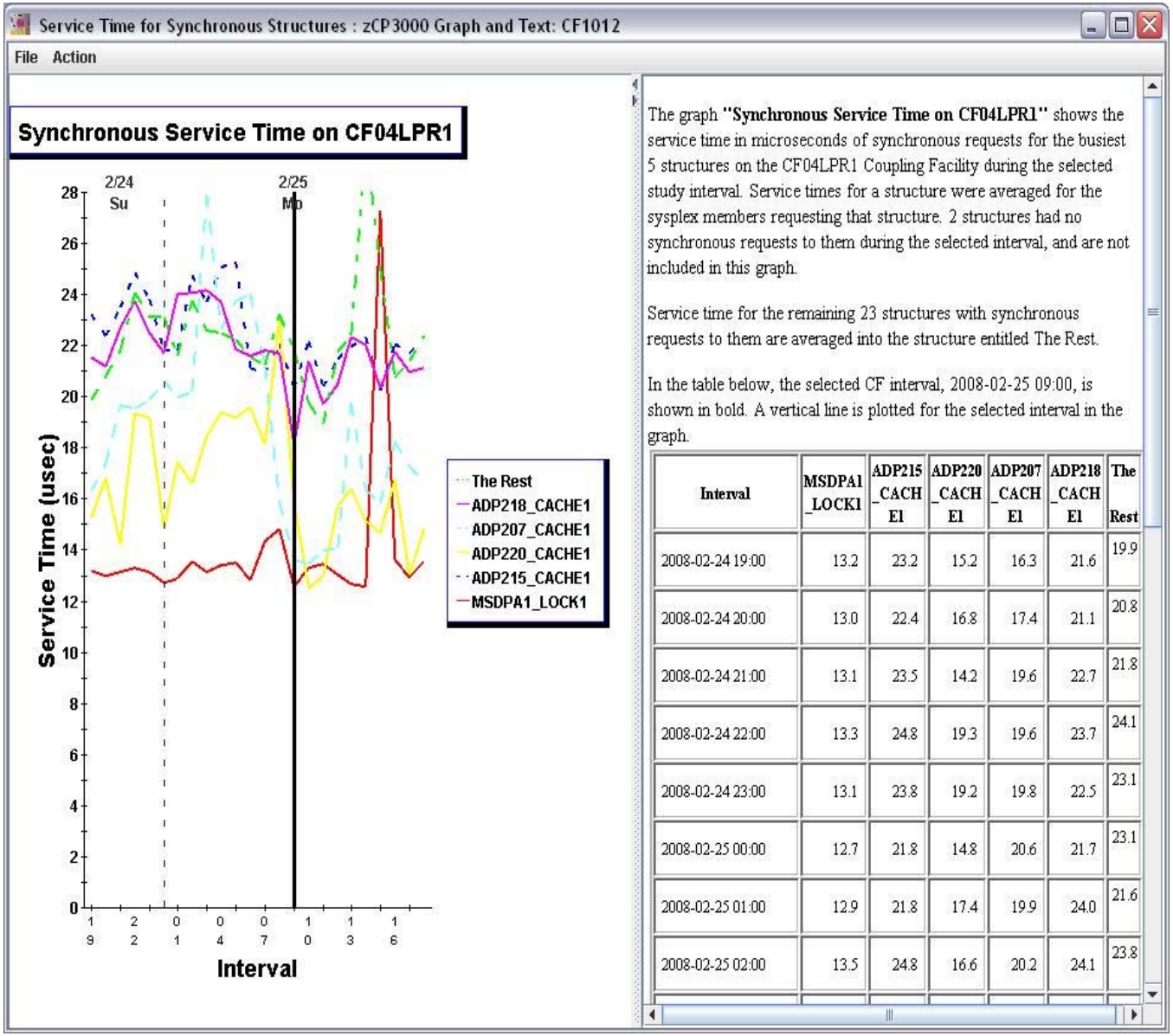


Interval	Utilization
2/24/2008 19:00	9.0%
2/24/2008 20:00	9.0%
2/24/2008 21:00	15.3%
2/24/2008 22:00	25.8%
2/24/2008 23:00	21.9%
2/25/2008 00:00	21.1%
2/25/2008 01:00	21.1%
2/25/2008 02:00	23.4%
2/25/2008 03:00	17.4%
2/25/2008 04:00	17.1%
2/25/2008 05:00	18.7%
2/25/2008 06:00	15.7%
2/25/2008 07:00	23.8%
2/25/2008 08:00	29.1%
2/25/2008 09:00	16.5%
2/25/2008 10:00	15.0%
2/25/2008 11:00	13.7%
2/25/2008 12:00	15.0%
2/25/2008 13:00	14.1%

Synchronous Service Time

Glimpse at the 5 Busiest Structures

Average of all sysplex members

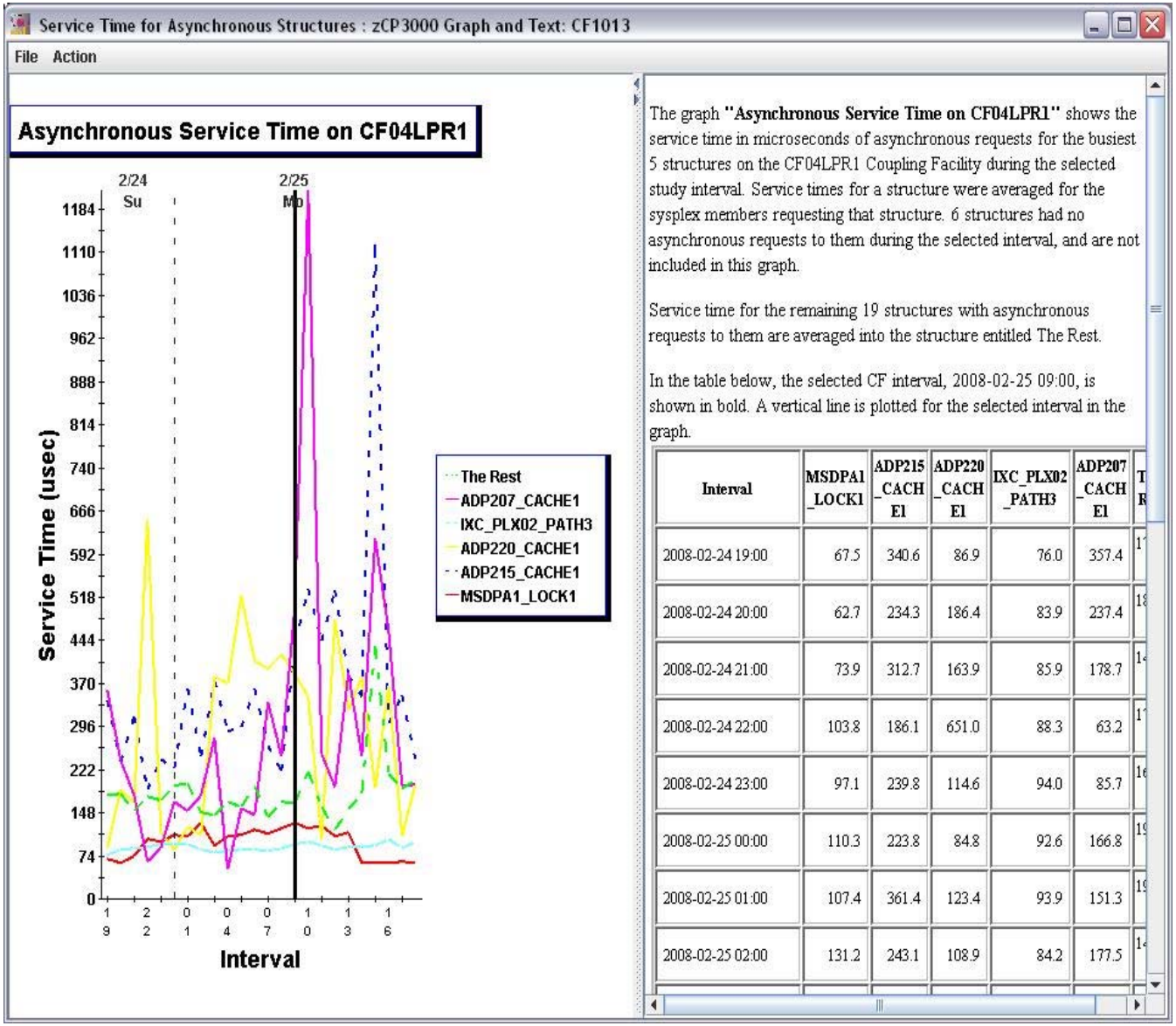


Interval	MSDPA1_LOCK1	ADP215_CACHE1	ADP220_CACHE1	ADP207_CACHE1	ADP218_CACHE1	The Rest
2008-02-24 19:00	13.2	23.2	15.2	16.3	21.6	19.9
2008-02-24 20:00	13.0	22.4	16.8	17.4	21.1	20.8
2008-02-24 21:00	13.1	23.5	14.2	19.6	22.7	21.8
2008-02-24 22:00	13.3	24.8	19.3	19.6	23.7	24.1
2008-02-24 23:00	13.1	23.8	19.2	19.8	22.5	23.1
2008-02-25 00:00	12.7	21.8	14.8	20.6	21.7	23.1
2008-02-25 01:00	12.9	21.8	17.4	19.9	24.0	21.6
2008-02-25 02:00	13.5	24.8	16.6	20.2	24.1	23.8

Asynchronous Service Time

5 Busiest Structures

Average of all sysplex members



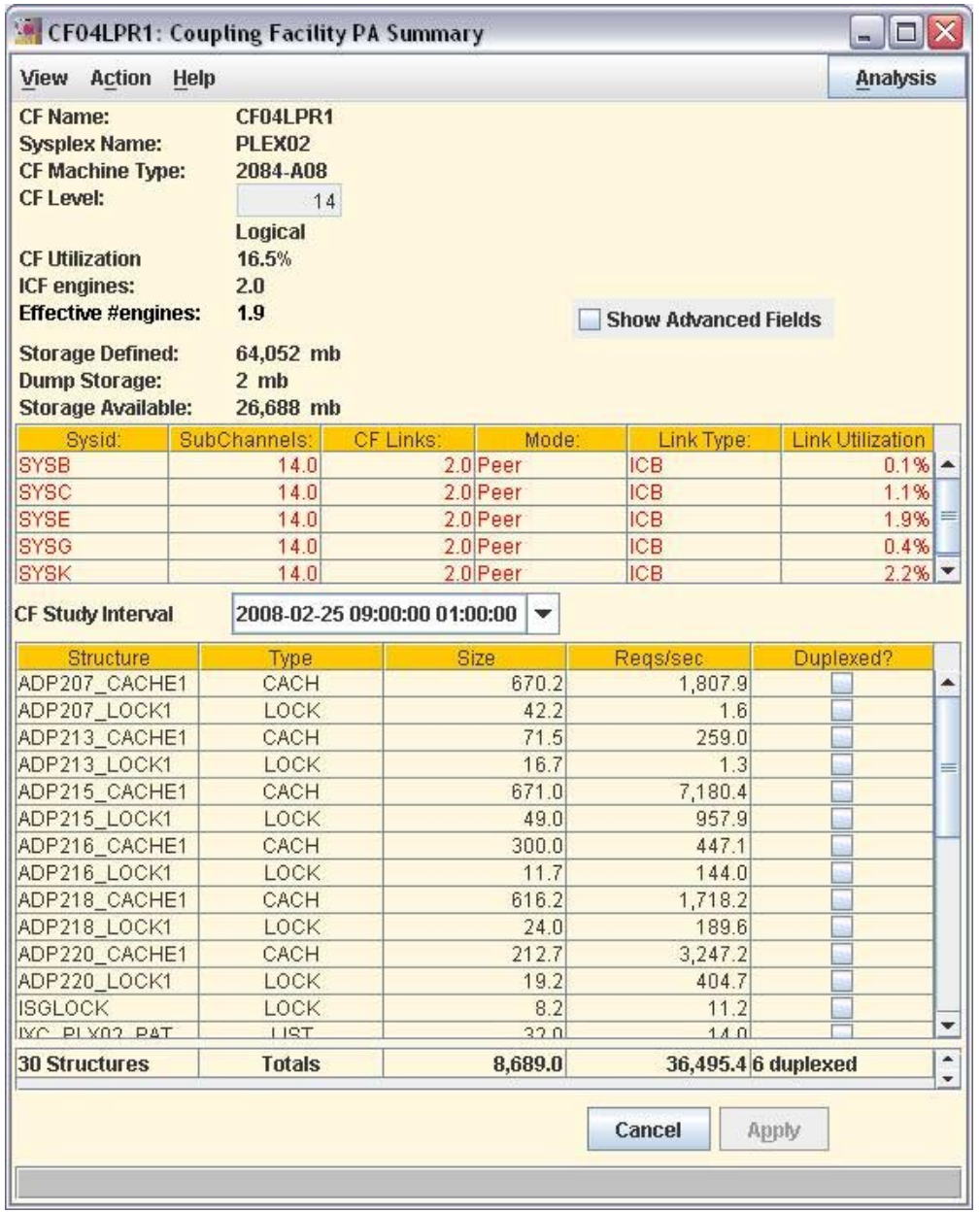
Interval	MSDPA1_LOCK1	ADP215_CACHE1	ADP220_CACHE1	IXC_PLX02_PATH3	ADP207_CACHE1	T R
2008-02-24 19:00	67.5	340.6	86.9	76.0	357.4	1
2008-02-24 20:00	62.7	234.3	186.4	83.9	237.4	1
2008-02-24 21:00	73.9	312.7	163.9	85.9	178.7	1
2008-02-24 22:00	103.8	186.1	651.0	88.3	63.2	1
2008-02-24 23:00	97.1	239.8	114.6	94.0	85.7	1
2008-02-25 00:00	110.3	223.8	84.8	92.6	166.8	1
2008-02-25 01:00	107.4	361.4	123.4	93.9	151.3	1
2008-02-25 02:00	131.2	243.1	108.9	84.2	177.5	1

Why CF level Graphs?

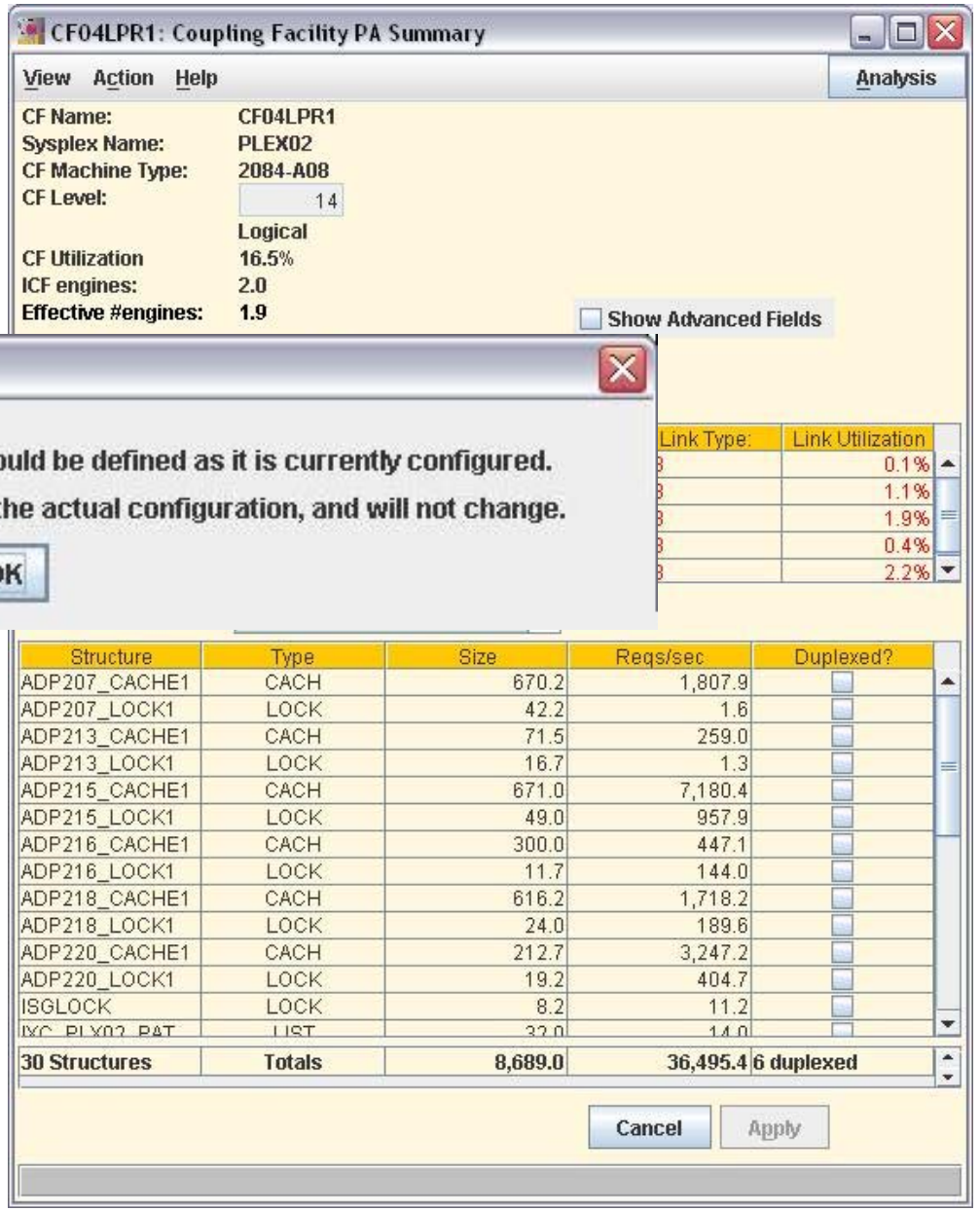
- CF Health Check Rules of Thumb
- General View of Performance
- Identify Focus Areas for Further Study

Coupling Facility Summary

Double click a CF Link to see detail



Coupling Facility Summary



Plain English:

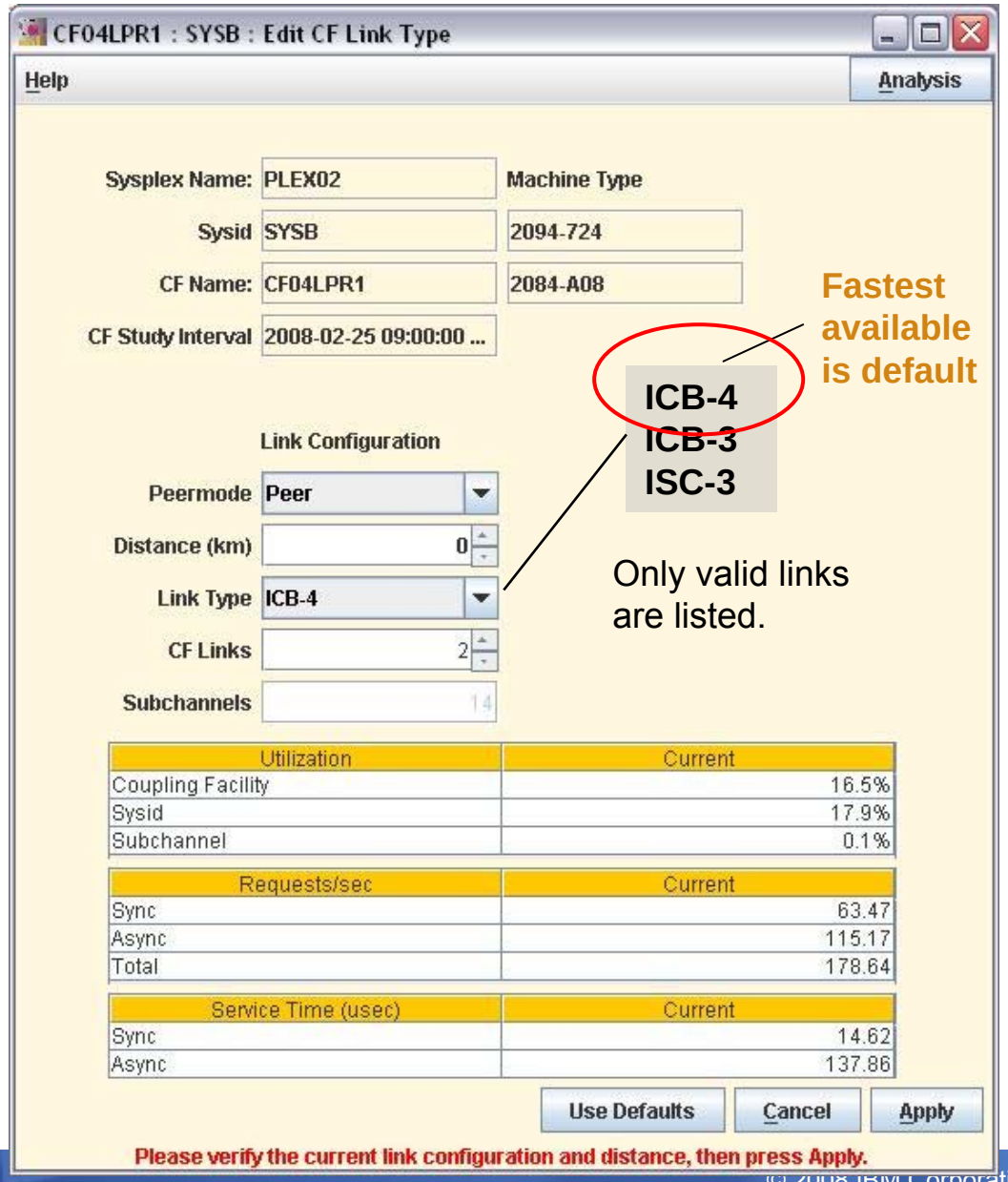
You cannot see the effect of a configuration change this way.

Edit CF Link Type

CF and SYS Info

Link Configuration

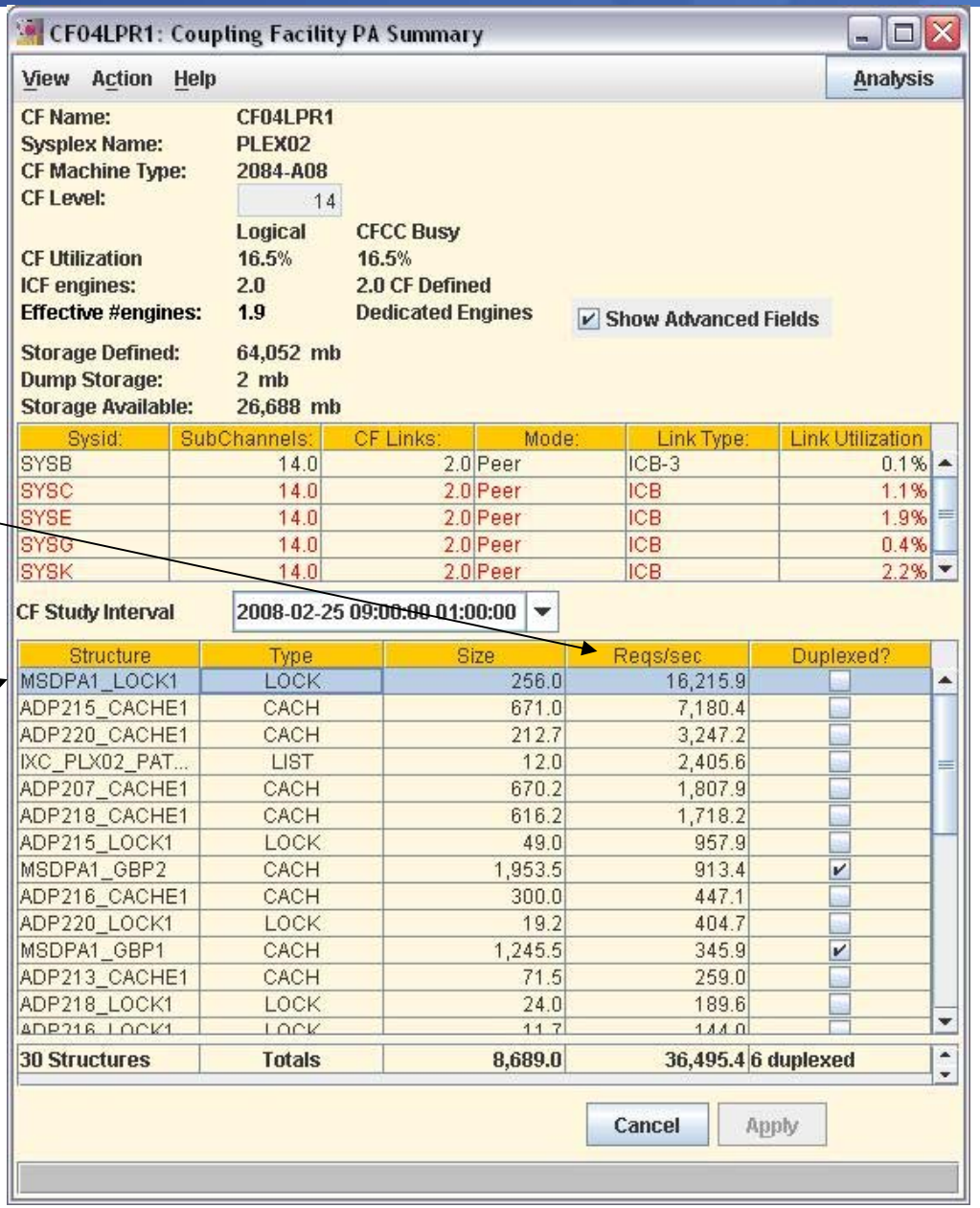
Performance Information



Coupling Facility Summary

Click on column head to sort, again to toggle order

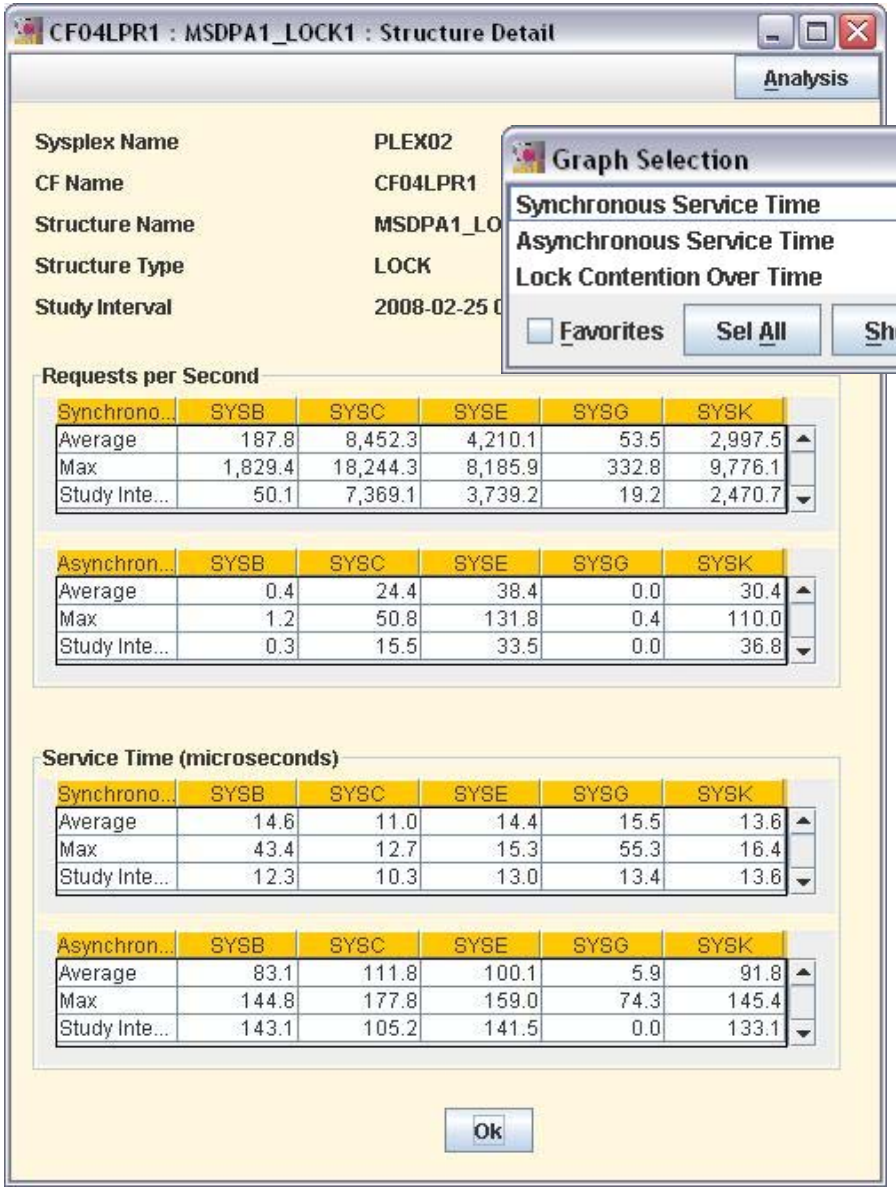
Double click a row to see Structure detail



Structure Detail

Request Rate by System →

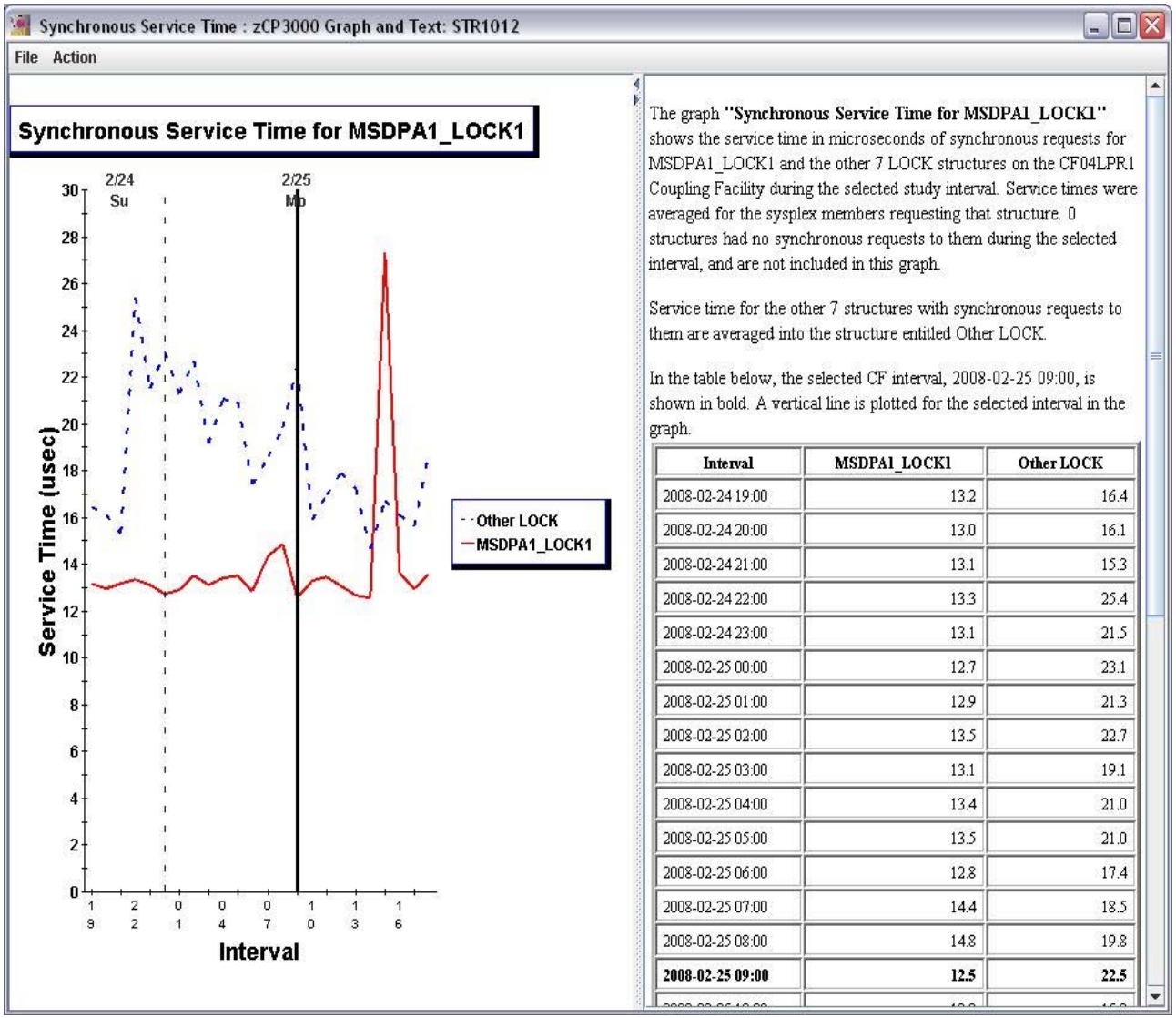
Service Time by System →



Structure Synchronous Service Time

How happy is this particular structure?

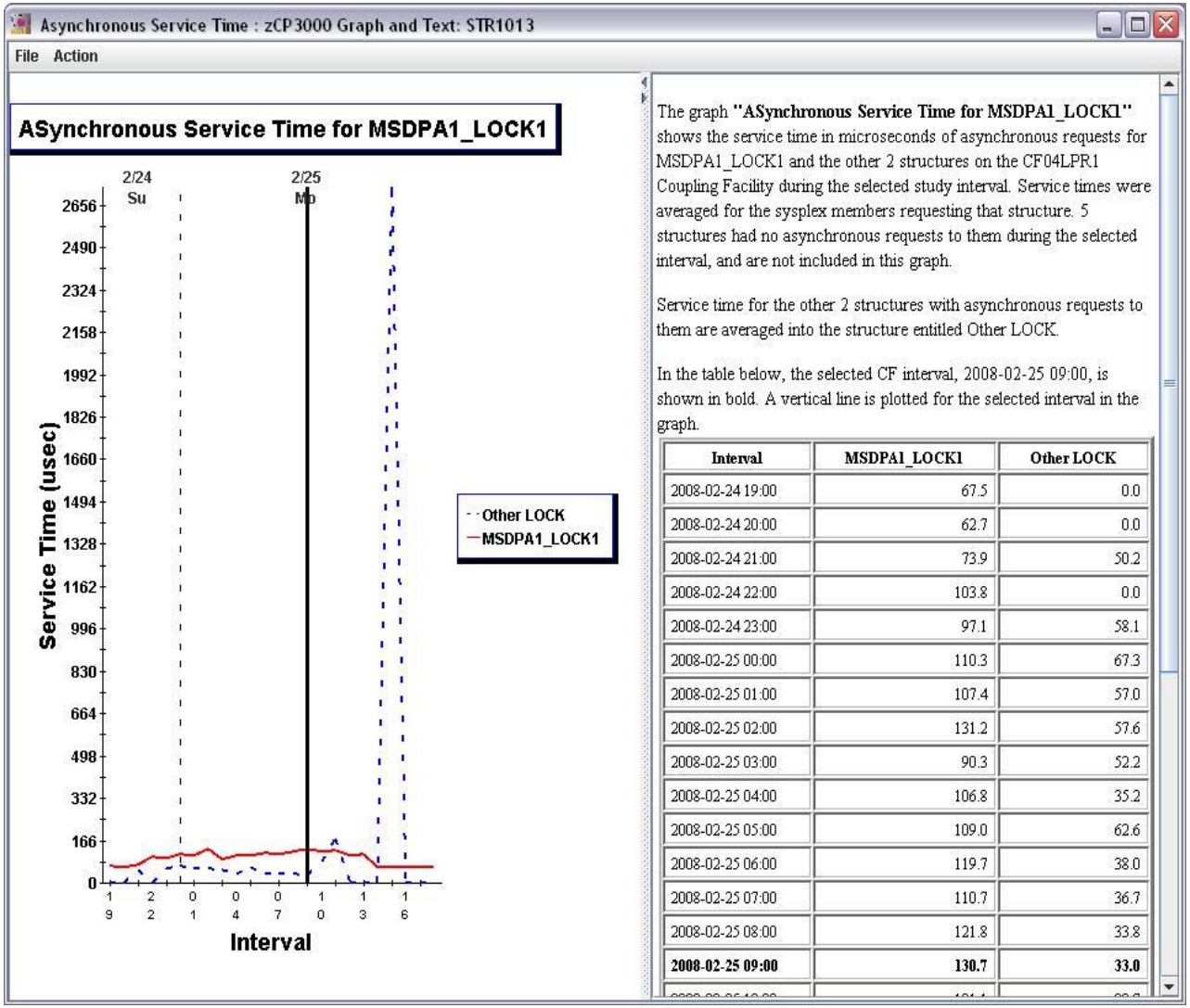
This does not tell you about the link.



Interval	MSDPA1_LOCK1	Other LOCK
2008-02-24 19:00	13.2	16.4
2008-02-24 20:00	13.0	16.1
2008-02-24 21:00	13.1	15.3
2008-02-24 22:00	13.3	25.4
2008-02-24 23:00	13.1	21.5
2008-02-25 00:00	12.7	23.1
2008-02-25 01:00	12.9	21.3
2008-02-25 02:00	13.5	22.7
2008-02-25 03:00	13.1	19.1
2008-02-25 04:00	13.4	21.0
2008-02-25 05:00	13.5	21.0
2008-02-25 06:00	12.8	17.4
2008-02-25 07:00	14.4	18.5
2008-02-25 08:00	14.8	19.8
2008-02-25 09:00	**12.5**	**22.5**

Structure Asynchronous Service Time

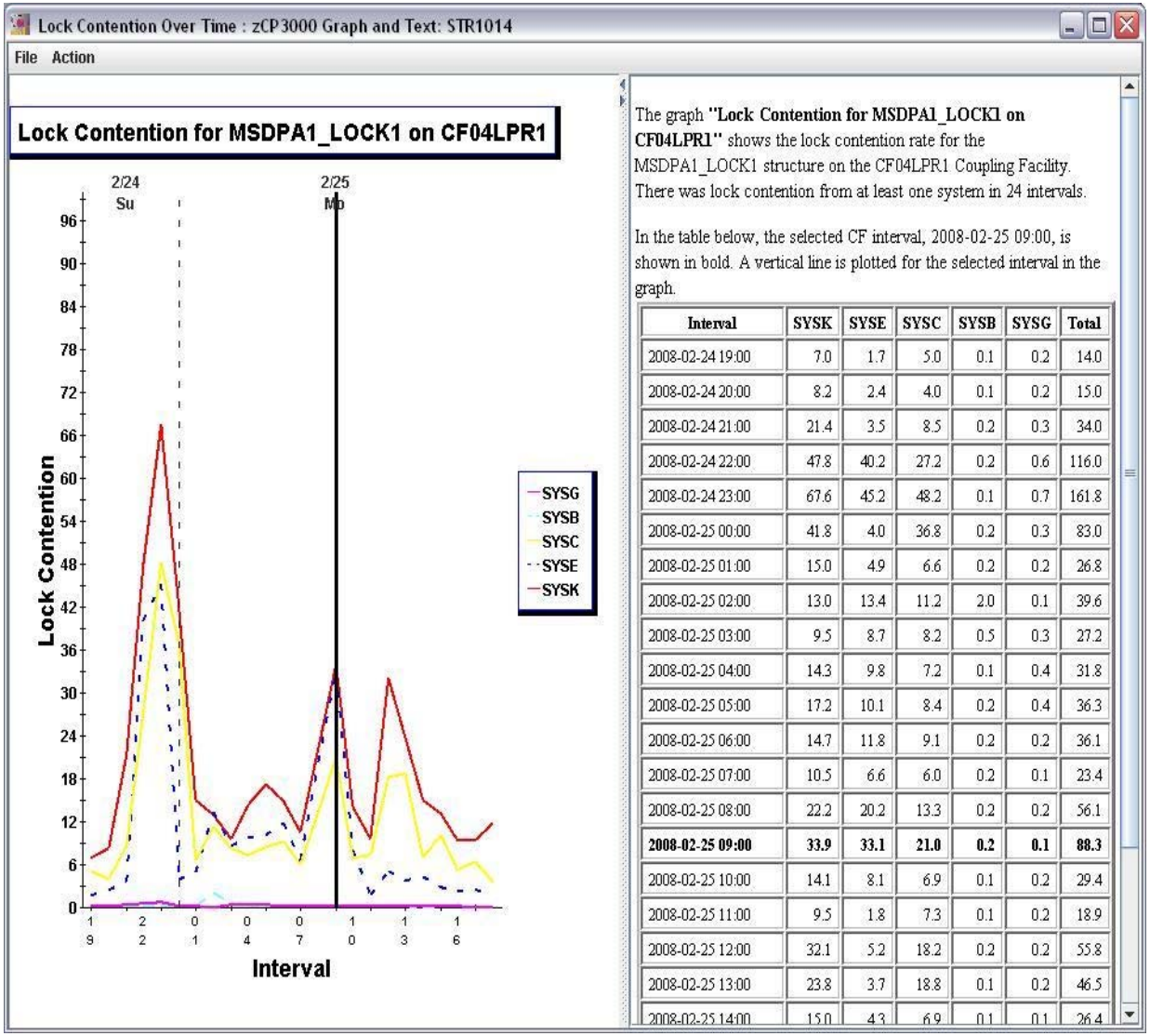
How important is asynchronous service?



Interval	MSDPA1_LOCK1	Other LOCK
2008-02-24 19:00	67.5	0.0
2008-02-24 20:00	62.7	0.0
2008-02-24 21:00	73.9	50.2
2008-02-24 22:00	103.8	0.0
2008-02-24 23:00	97.1	58.1
2008-02-25 00:00	110.3	67.3
2008-02-25 01:00	107.4	57.0
2008-02-25 02:00	131.2	57.6
2008-02-25 03:00	90.3	52.2
2008-02-25 04:00	106.8	35.2
2008-02-25 05:00	109.0	62.6
2008-02-25 06:00	119.7	38.0
2008-02-25 07:00	110.7	36.7
2008-02-25 08:00	121.8	33.8
2008-02-25 09:00	**130.7**	**33.0**

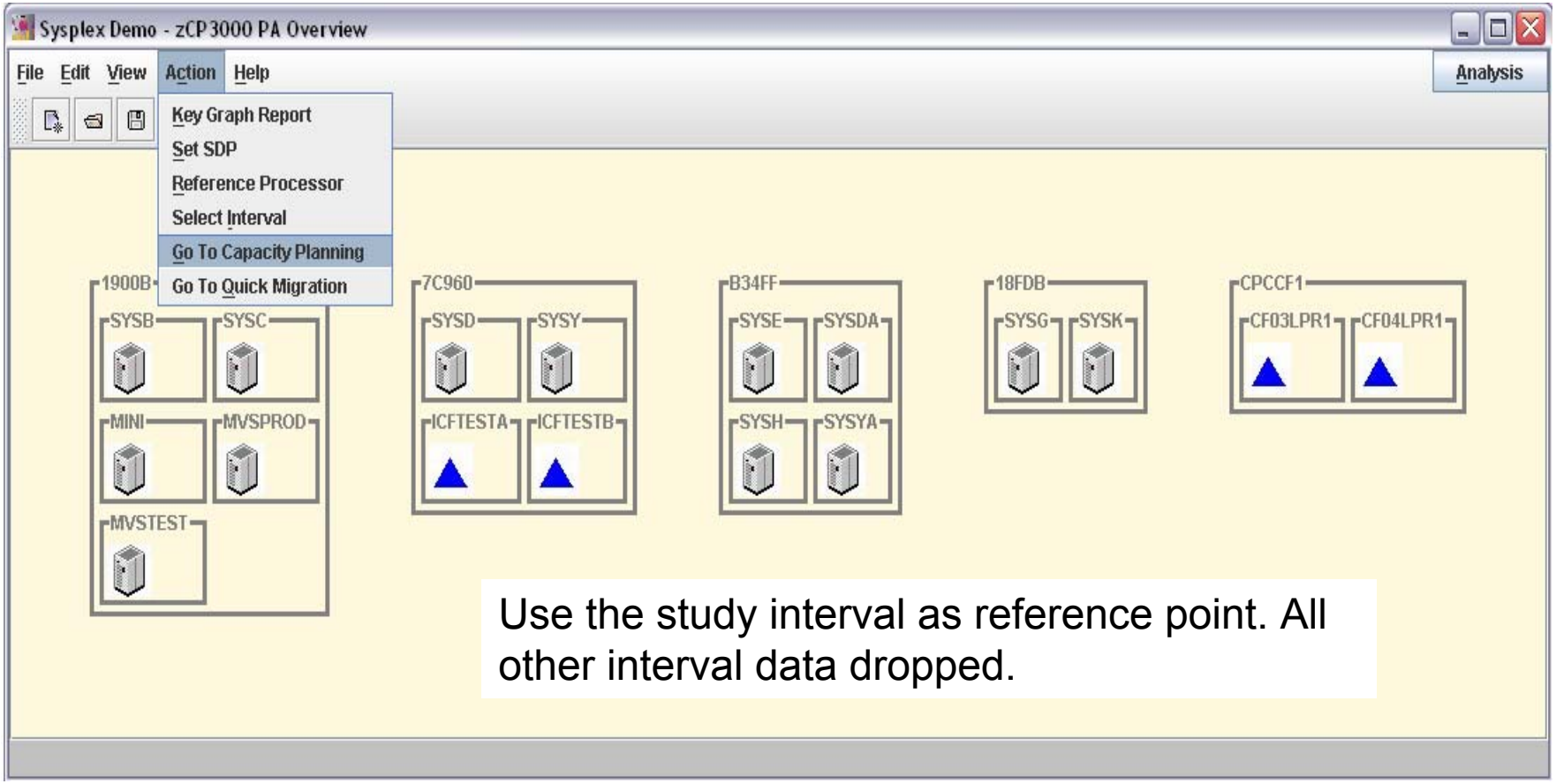
Structure Lock Contention

How important is asynchronous service?

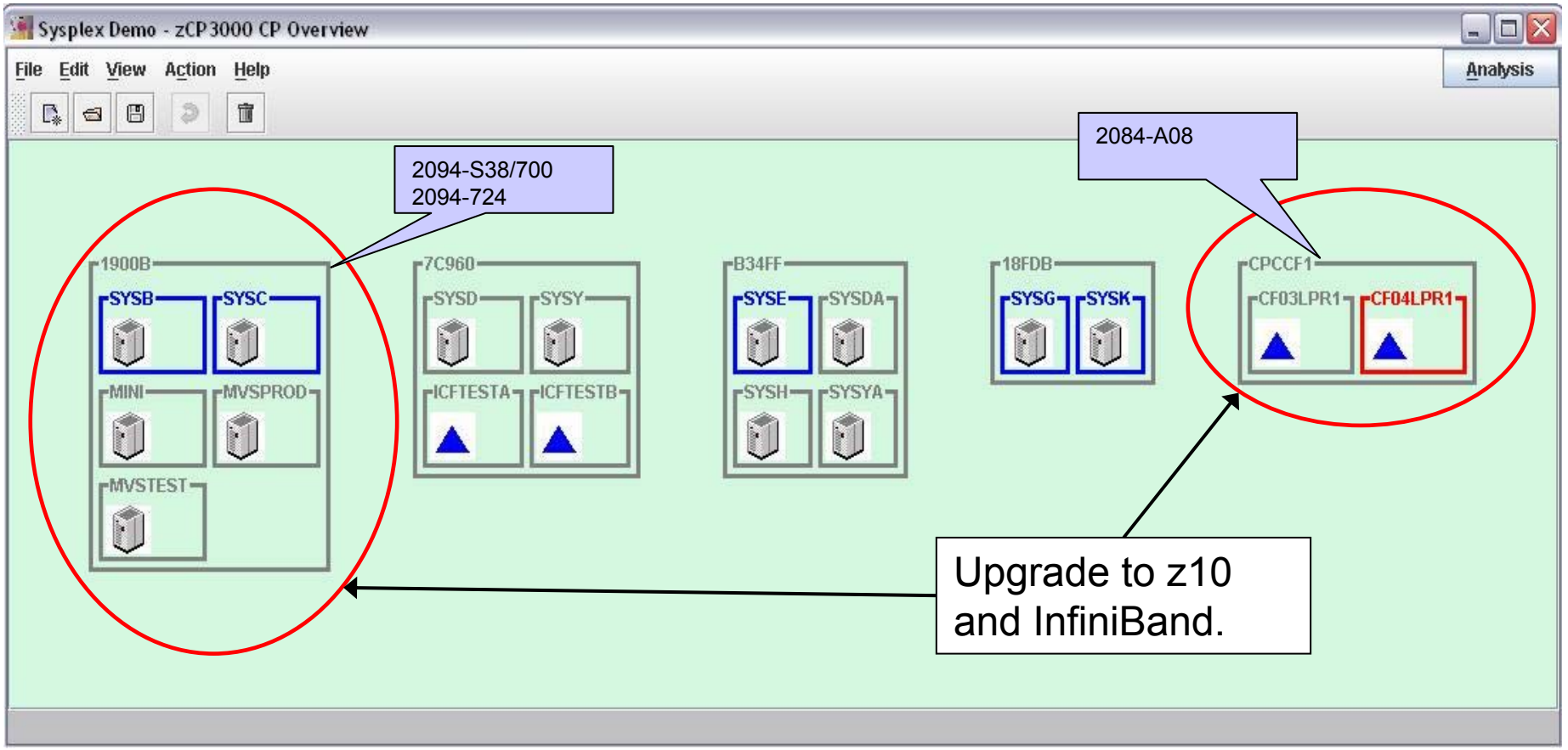


Interval	SYSK	SYSE	SYSC	SYSB	SYSG	Total
2008-02-24 19:00	7.0	1.7	5.0	0.1	0.2	14.0
2008-02-24 20:00	8.2	2.4	4.0	0.1	0.2	15.0
2008-02-24 21:00	21.4	3.5	8.5	0.2	0.3	34.0
2008-02-24 22:00	47.8	40.2	27.2	0.2	0.6	116.0
2008-02-24 23:00	67.6	45.2	48.2	0.1	0.7	161.8
2008-02-25 00:00	41.8	4.0	36.8	0.2	0.3	83.0
2008-02-25 01:00	15.0	4.9	6.6	0.2	0.2	26.8
2008-02-25 02:00	13.0	13.4	11.2	2.0	0.1	39.6
2008-02-25 03:00	9.5	8.7	8.2	0.5	0.3	27.2
2008-02-25 04:00	14.3	9.8	7.2	0.1	0.4	31.8
2008-02-25 05:00	17.2	10.1	8.4	0.2	0.4	36.3
2008-02-25 06:00	14.7	11.8	9.1	0.2	0.2	36.1
2008-02-25 07:00	10.5	6.6	6.0	0.2	0.1	23.4
2008-02-25 08:00	22.2	20.2	13.3	0.2	0.2	56.1
2008-02-25 09:00	**33.9**	**33.1**	**21.0**	**0.2**	**0.1**	**88.3**
2008-02-25 10:00	14.1	8.1	6.9	0.1	0.2	29.4
2008-02-25 11:00	9.5	1.8	7.3	0.1	0.2	18.9
2008-02-25 12:00	32.1	5.2	18.2	0.2	0.2	55.8
2008-02-25 13:00	23.8	3.7	18.8	0.1	0.2	46.5
2008-02-25 14:00	15.0	4.3	6.9	0.1	0.1	26.4

Capacity Planning Mode

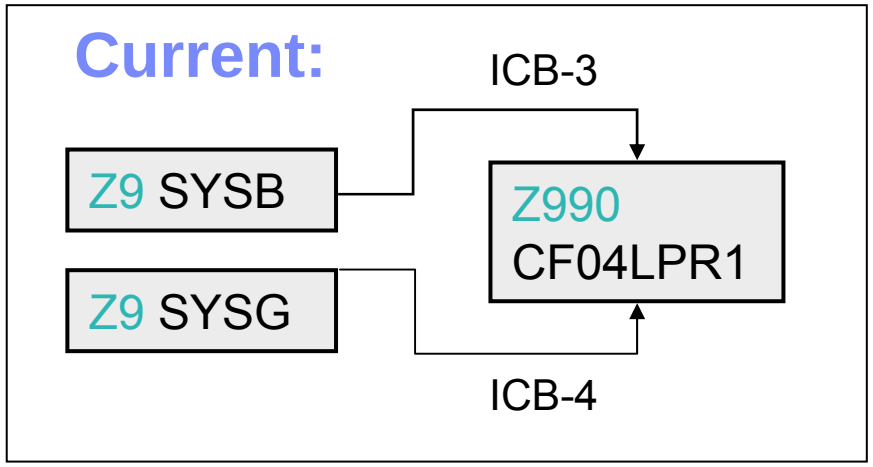


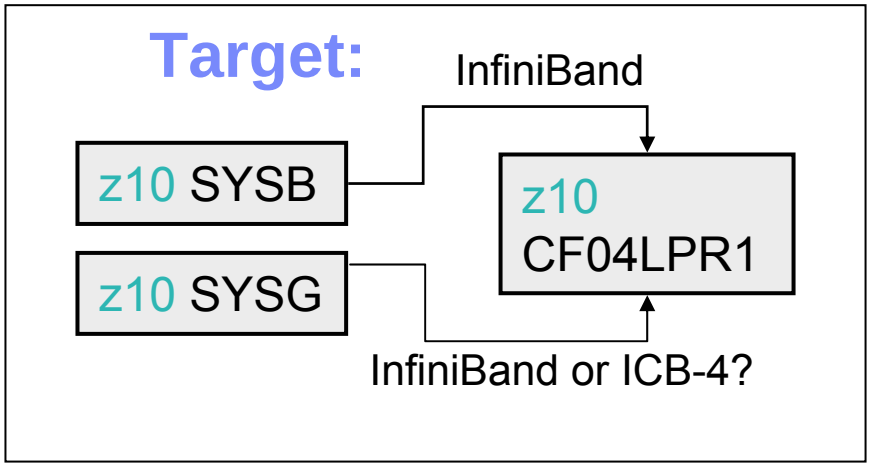
Capacity Planning Mode



Change configuration in steps

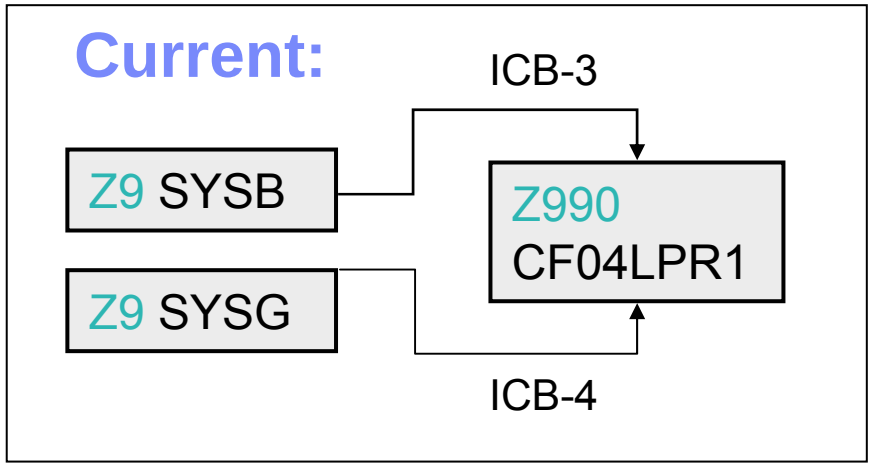
- If z10, all members of sysplex must be z10, z9, z990, z890 only
- z10 support ISC-3, ICB-4, InfiniBand only
- For link type change, both “before” and “after” must be valid.
  - ICB-3 not valid on z10; InfiniBand not valid on z990

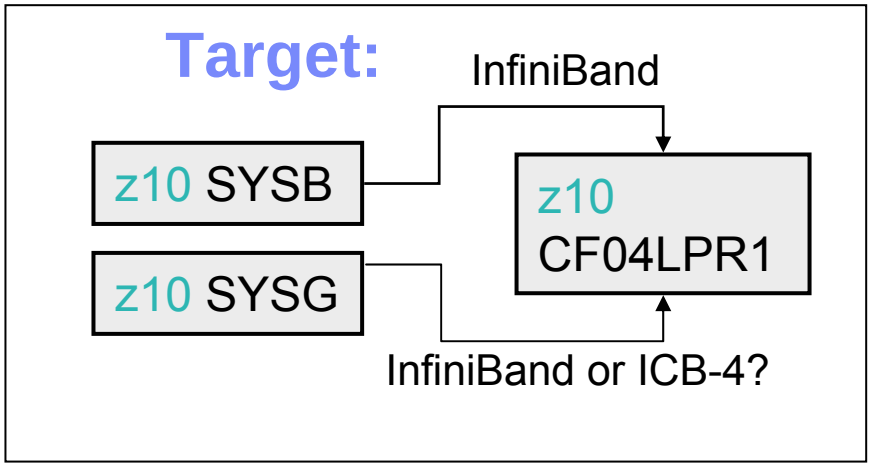




Change configuration in steps

1. Entire config ok if CF CEC changes to z10?
2. Change SYSB-CF link from ICB-3 to ICB-4
3. Change SYSB/SYSG CEC from 2094-724 to 2097-724
4. Change CFCCF1 to 2097-401 w/ 4 ICFs

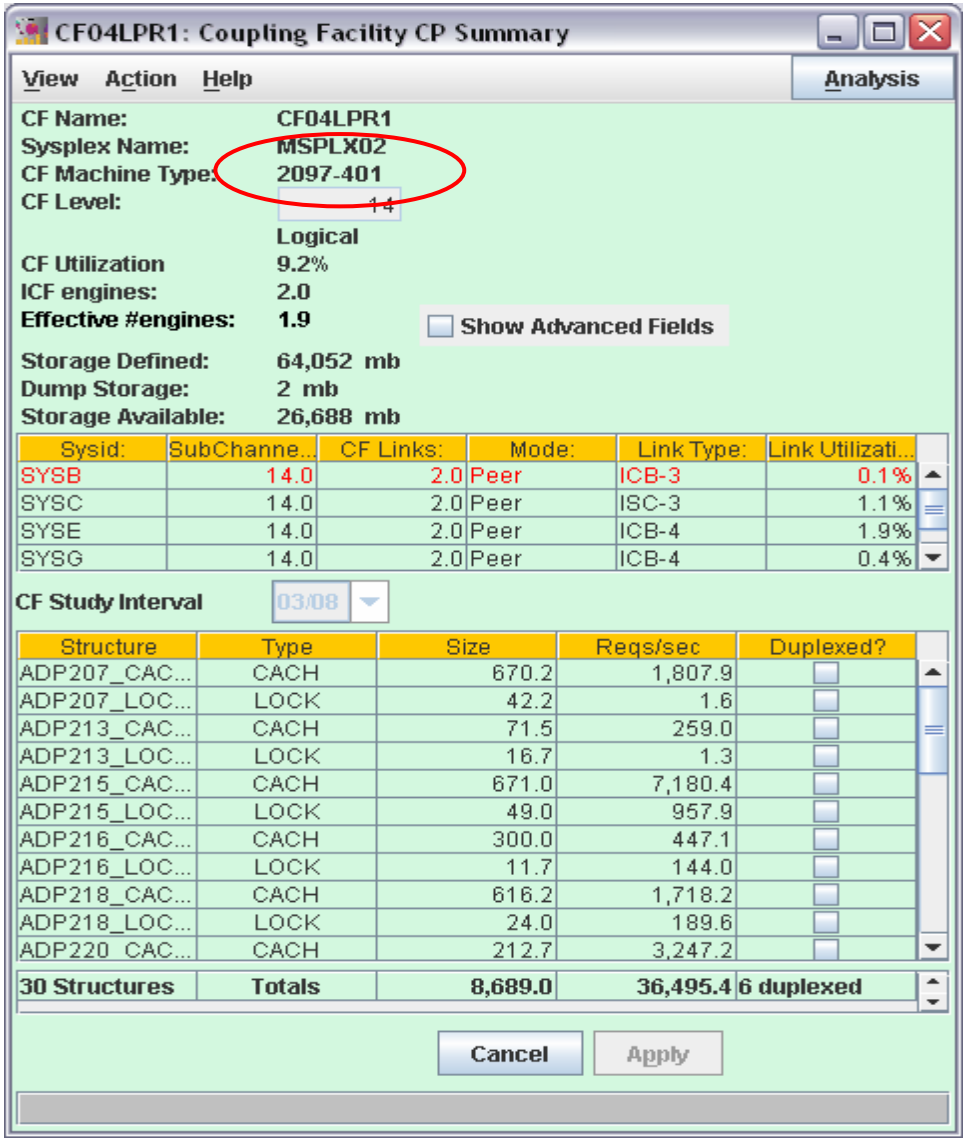




The order changes are done in can be important.

This is what happens if you change the CEC first.

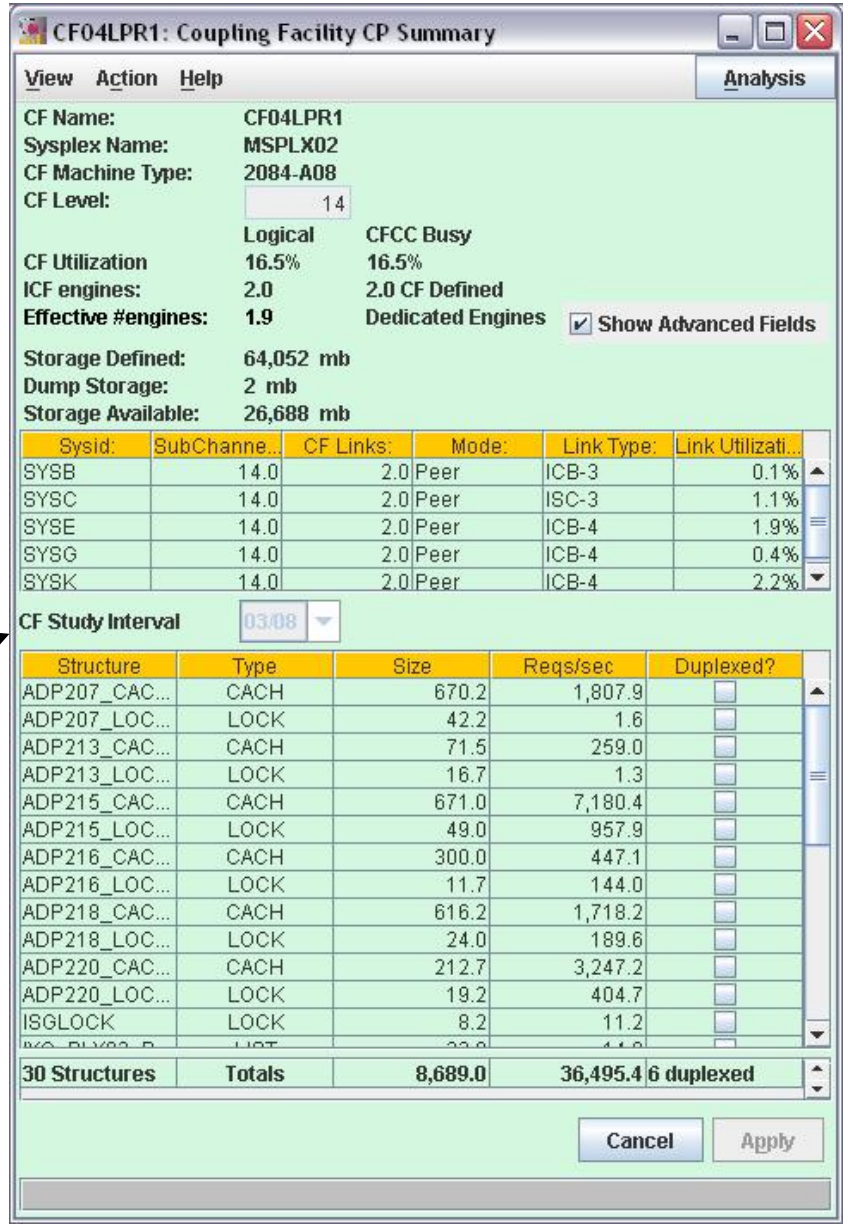
This invalid config will not be able to use the change link config button.



CF Summary Capacity Planning Mode

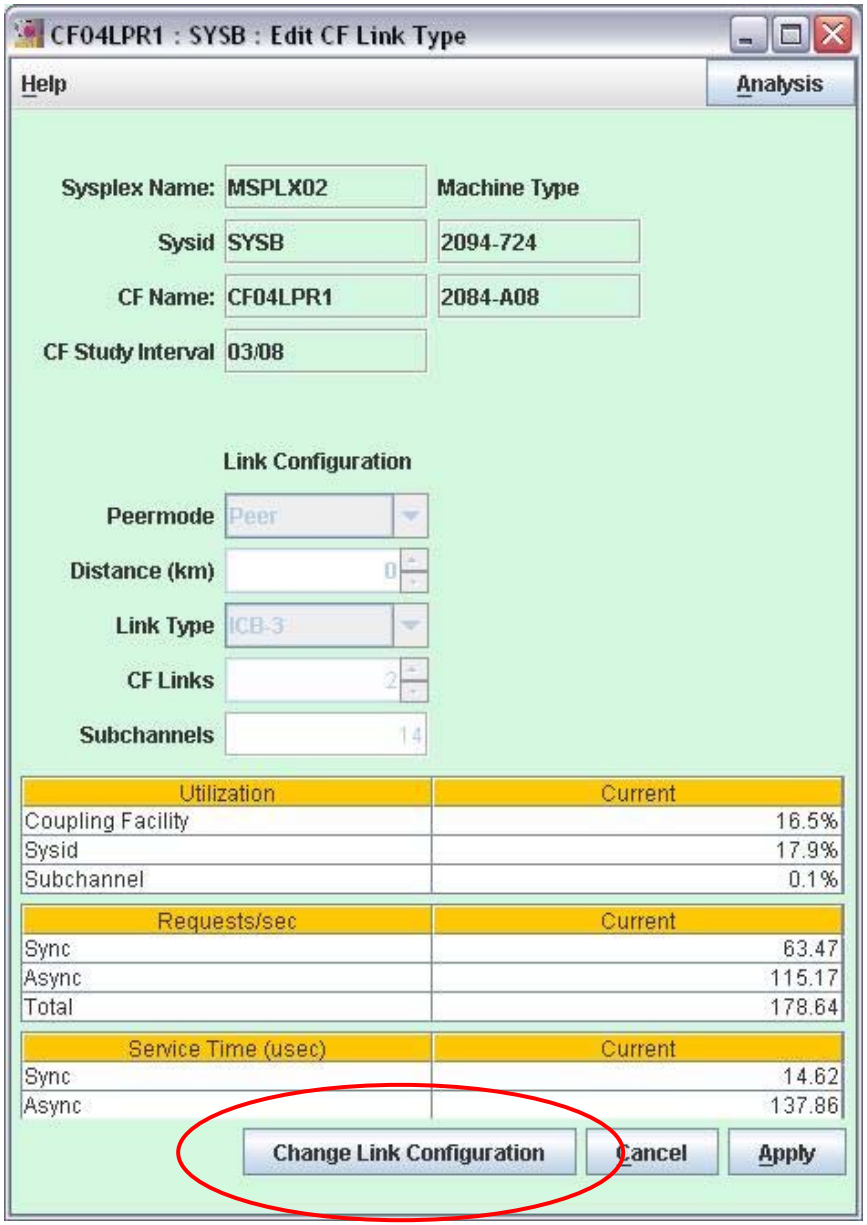
CF links were fully defined in PA mode.

Sysplex CP mode currently supports only one interval.



Change Link Configuration Button

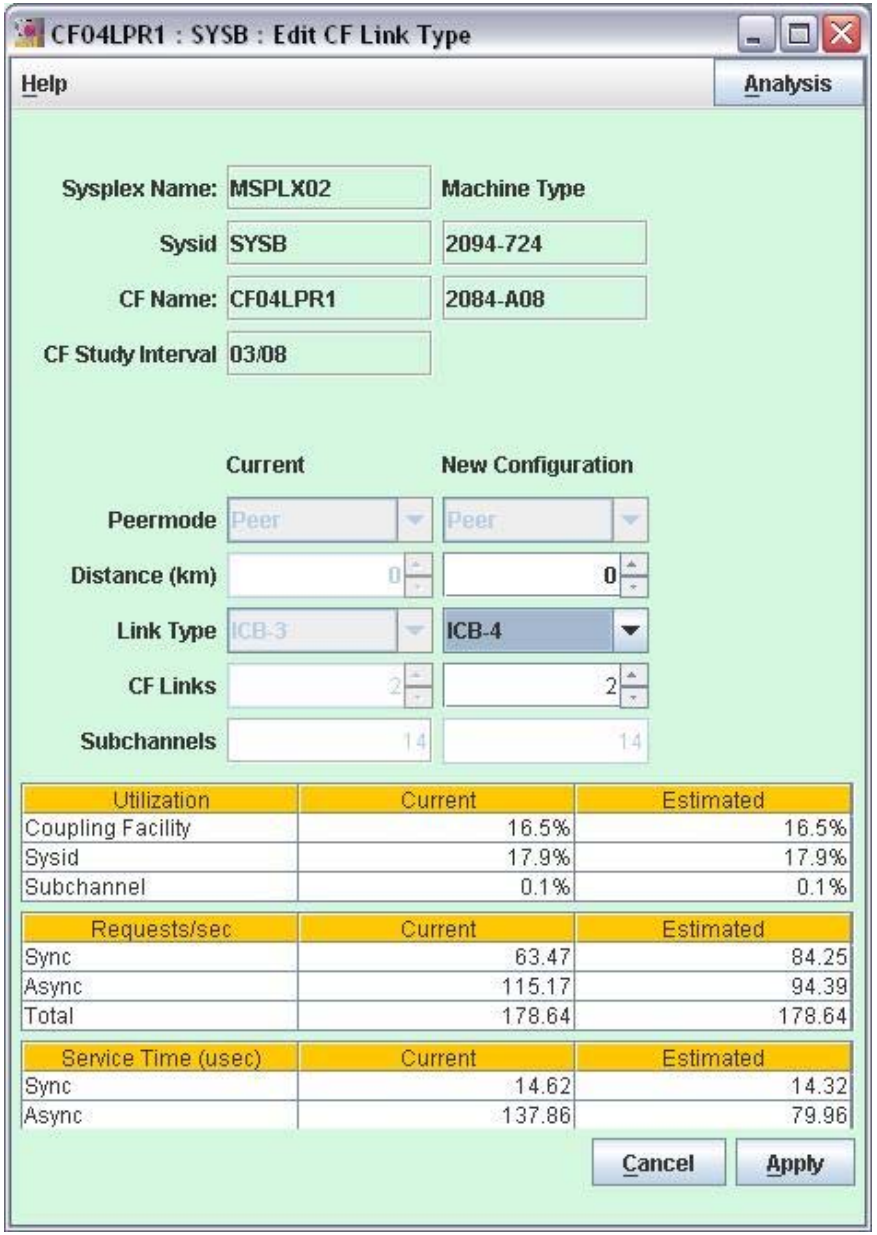
- appears in CP mode only
- link must be valid as currently defined



Change Link Configuration Button

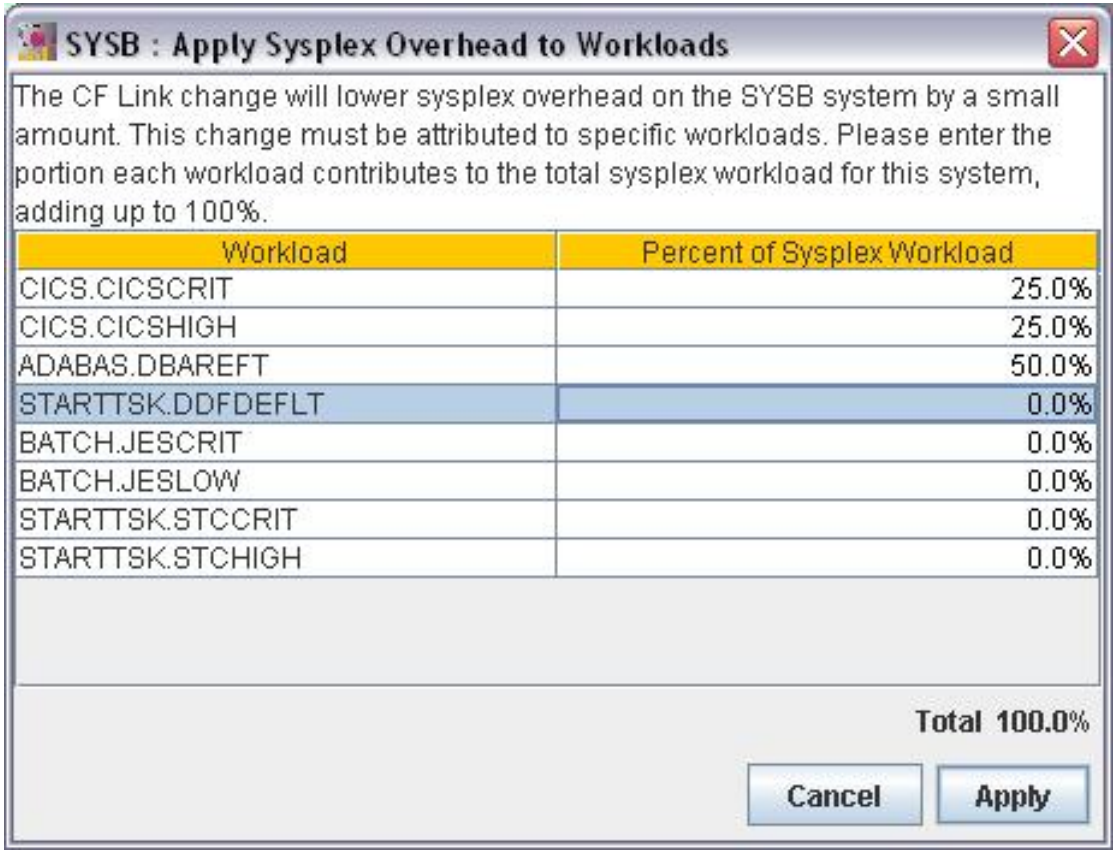
- Estimate is based on sysplex benchmark workload, with your req rate and characteristics

- sync/async ratio may change as effect of service time change

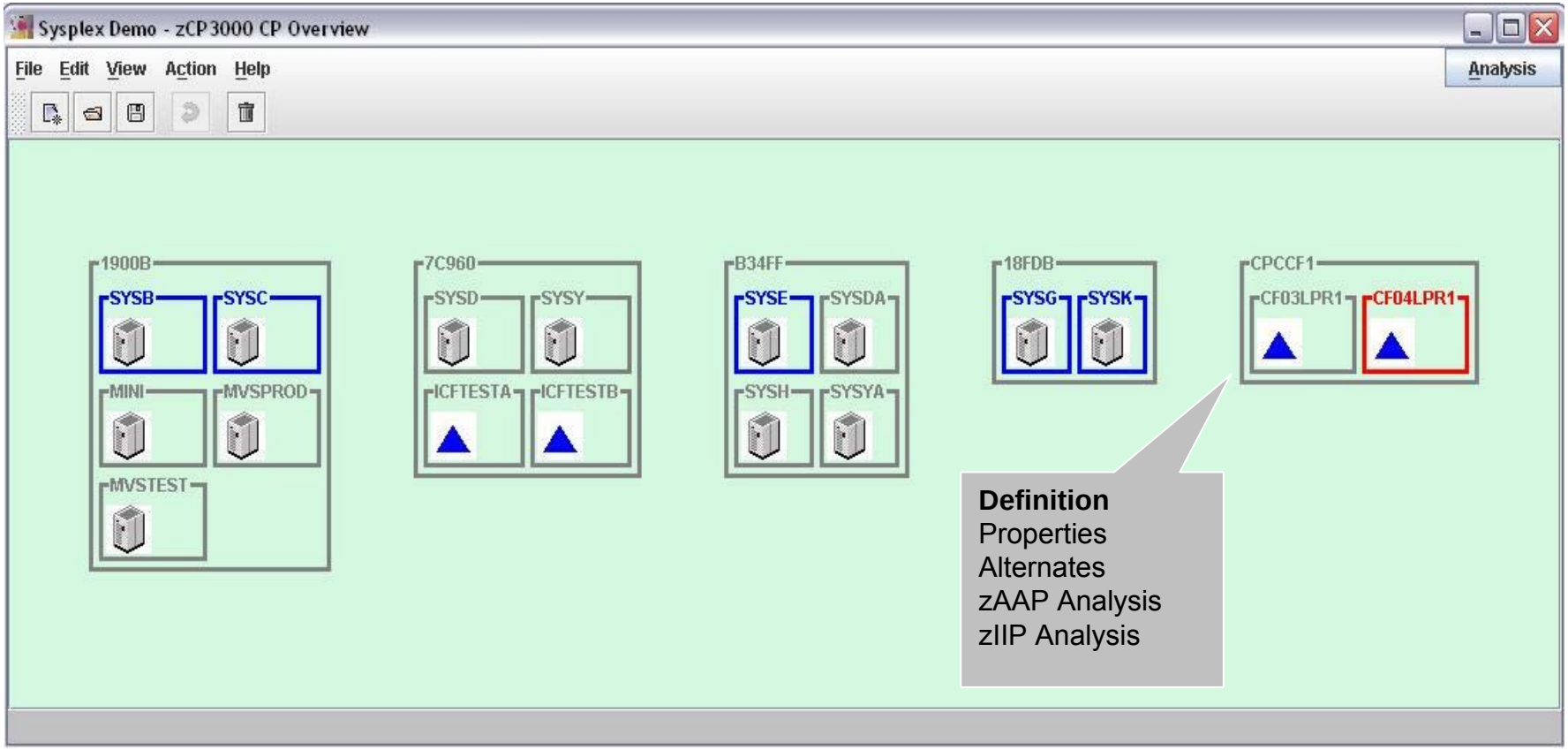


Adjust Sysplex Overhead

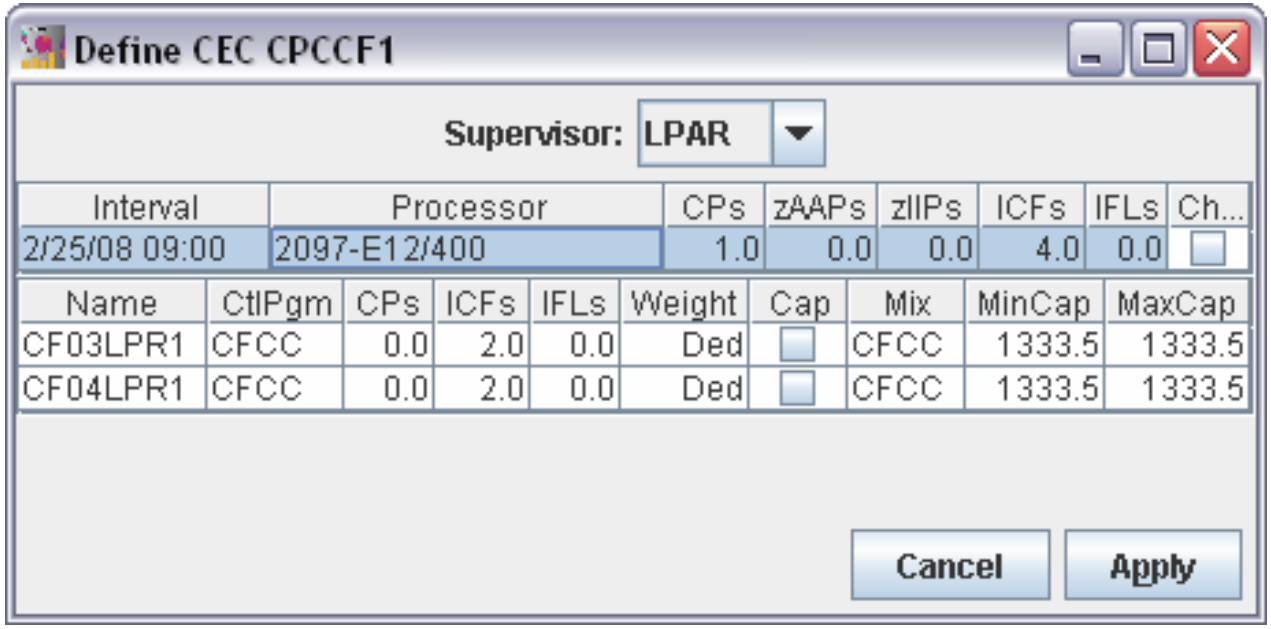
- Overhead changes when the sync/async ratio changes



Change the CF CEC Definition

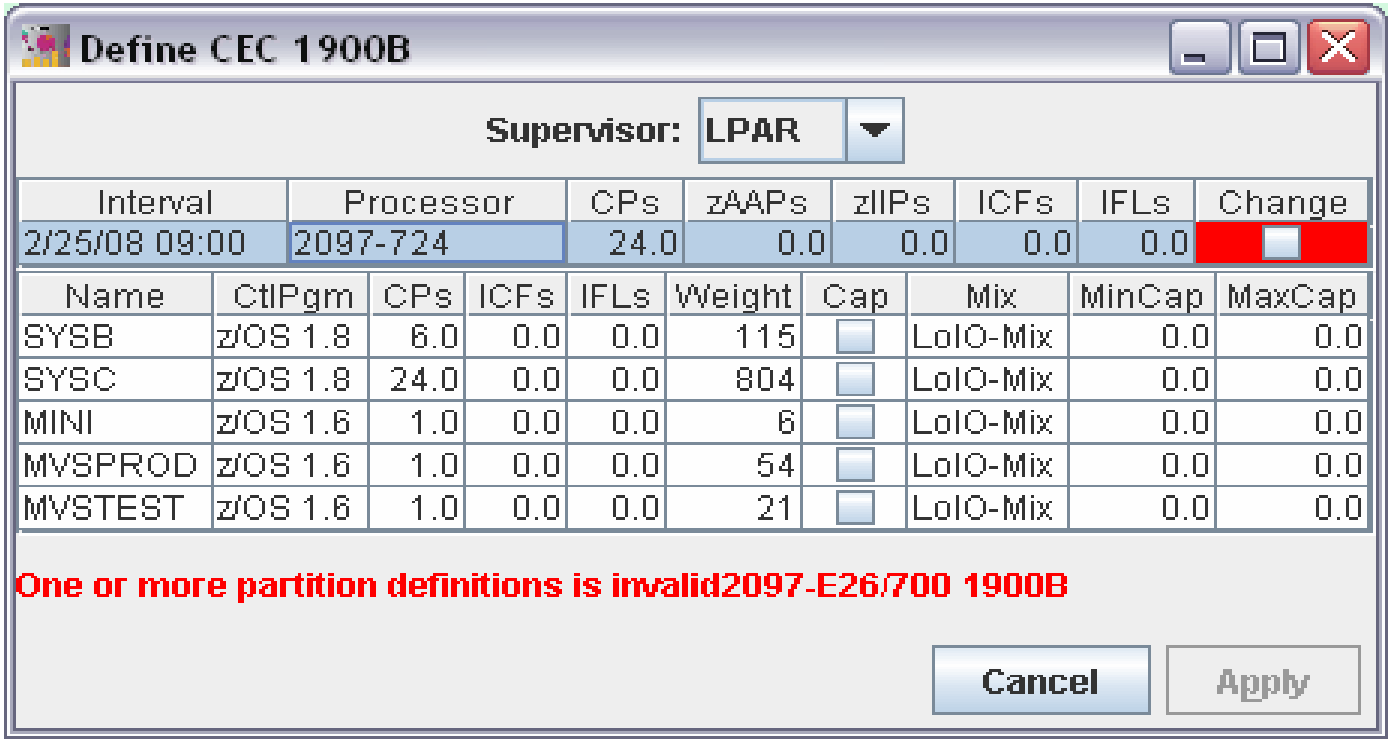


Redefine CF CEC to z10



Click Processor cell to select family and model.

Redefine z/OS member CEC to z10

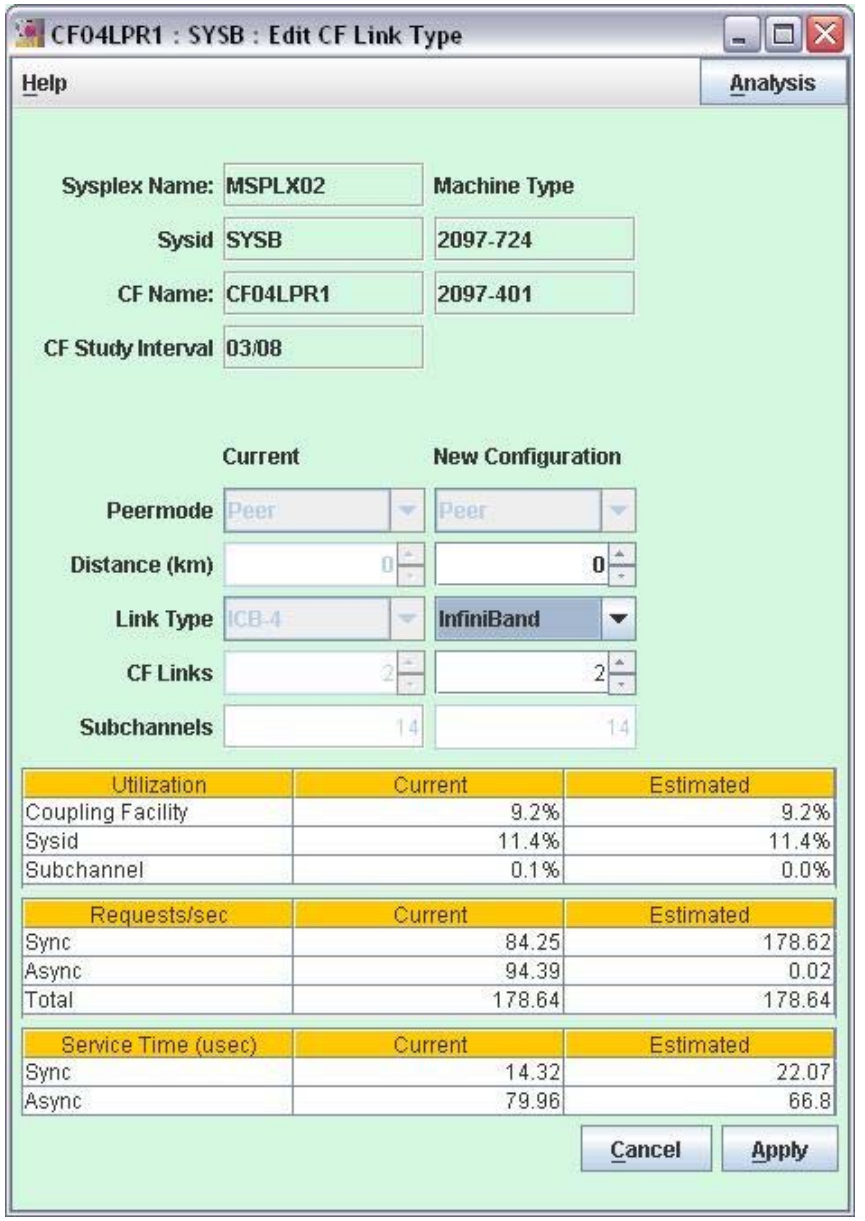


* z/OS 1.6 must be changed to z/OS 1.8

InfiniBand

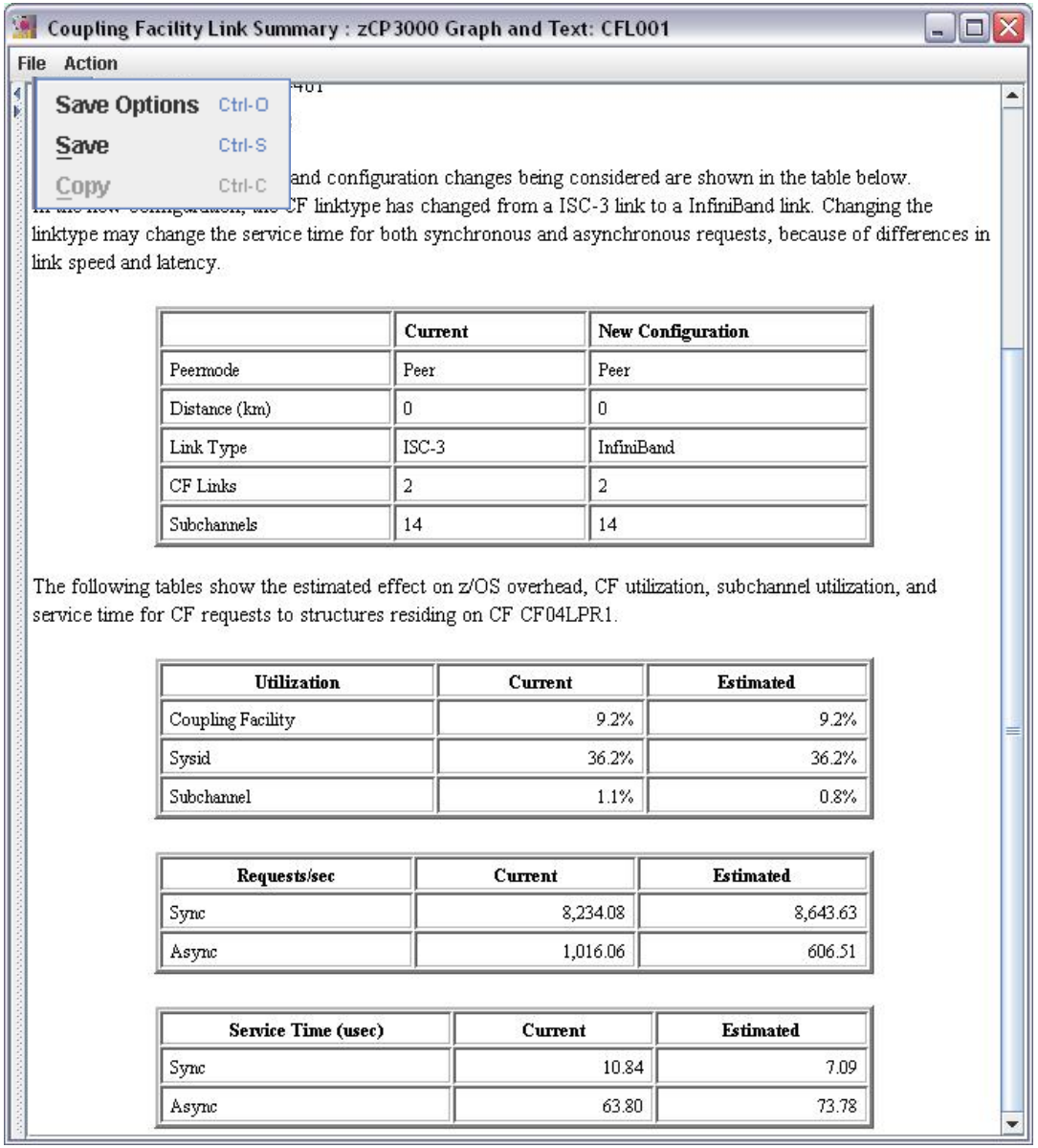
Not the fastest type of CF link

- Slower than ICB4
- Longer latency than any ICB
- Faster and shorter latency than any ISC
- tolerates longer distance than ICB



CF Link Summary Report

- an html report version of the CF Link window.
- File->Save to generate html/jpg



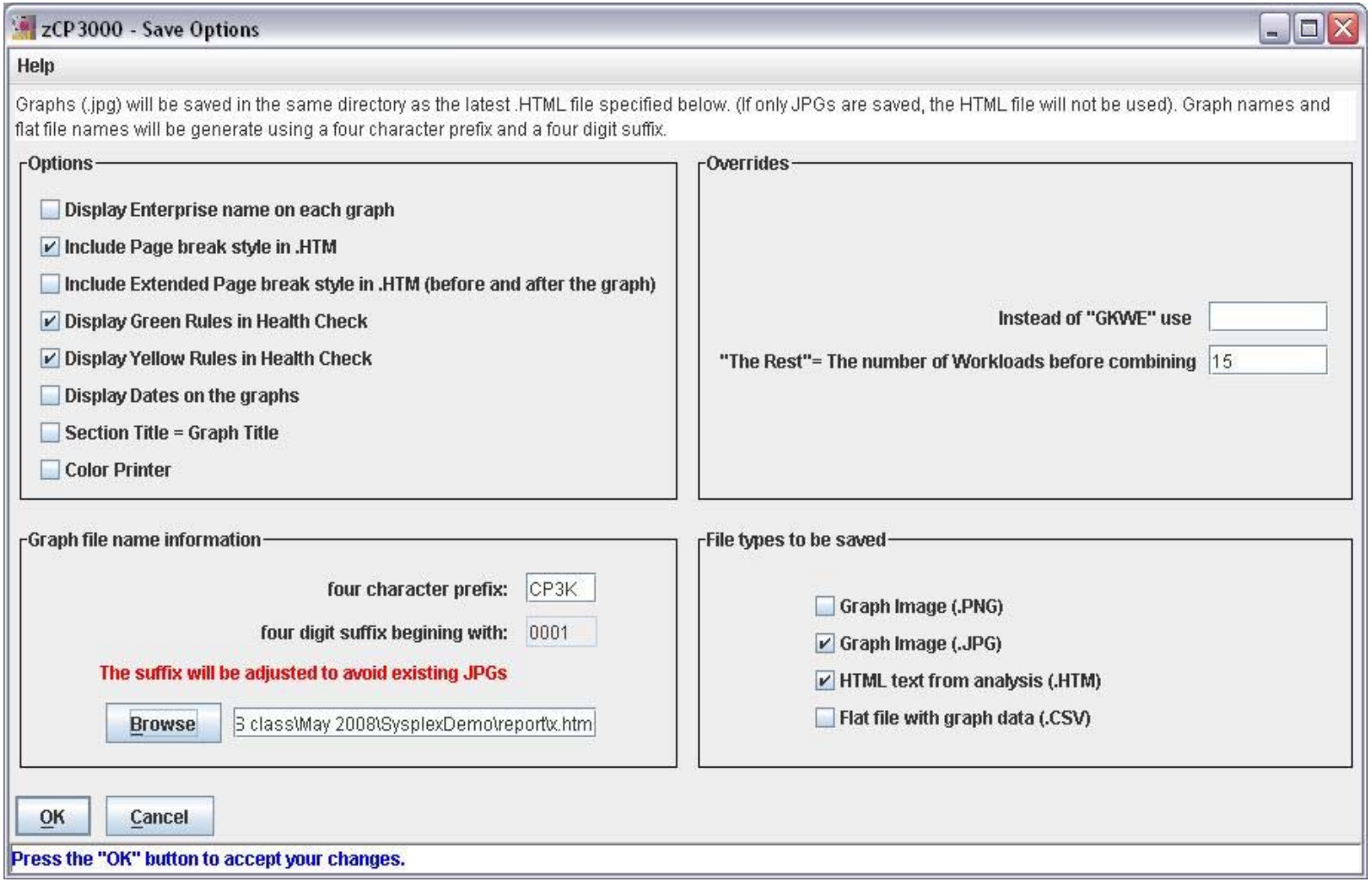
	Current	New Configuration
Peermode	Peer	Peer
Distance (km)	0	0
Link Type	ISC-3	InfiniBand
CF Links	2	2
Subchannels	14	14

Utilization	Current	Estimated
Coupling Facility	9.2%	9.2%
Sysid	36.2%	36.2%
Subchannel	1.1%	0.8%

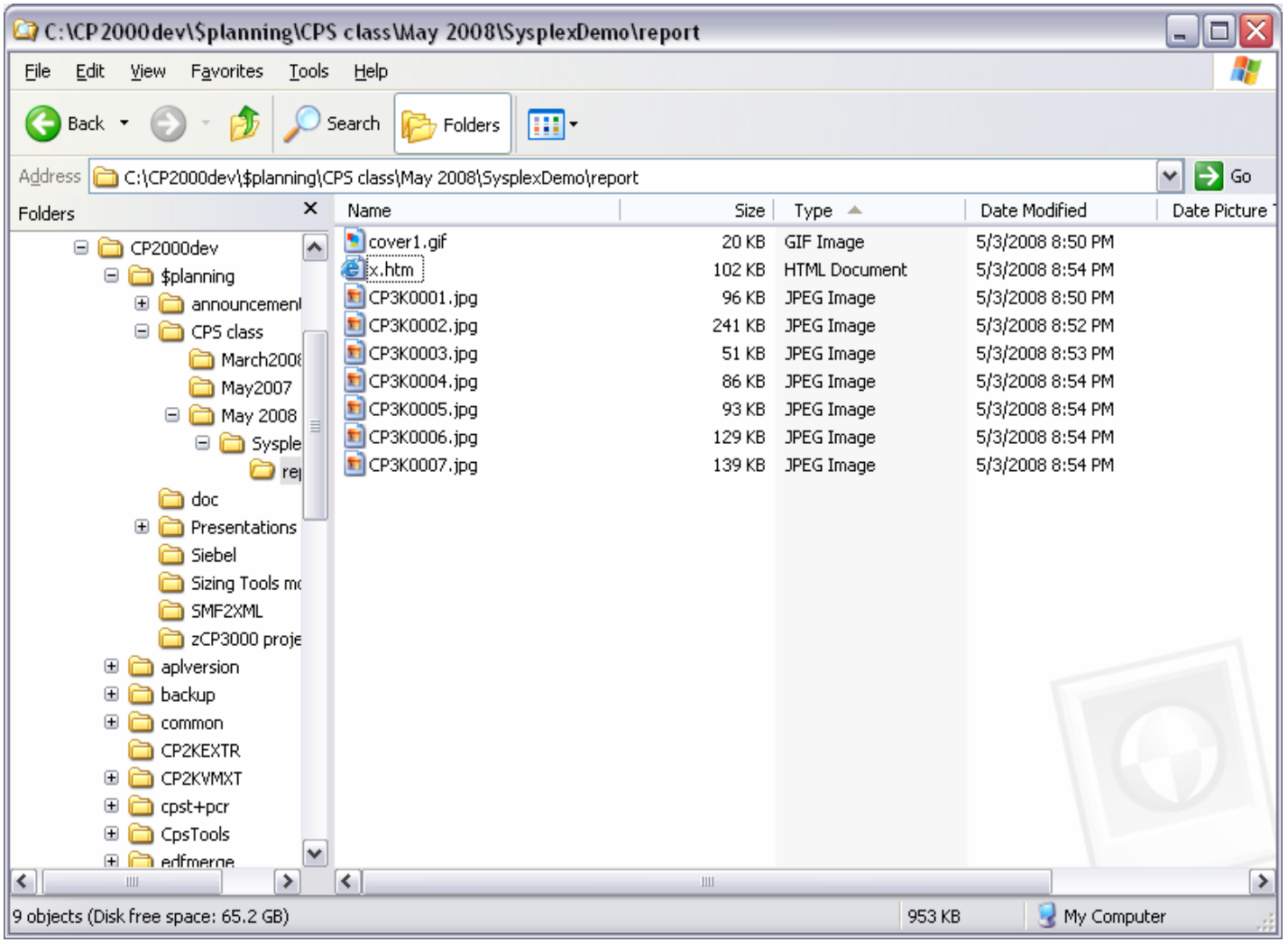
Requests/sec	Current	Estimated
Sync	8,234.08	8,643.63
Async	1,016.06	606.51

Service Time (usec)	Current	Estimated
Sync	10.84	7.09
Async	63.80	73.78

Creating Output



Generated Report



References

IBM Parallel Sysplex
- http://www.ibm.com/systems/z/pso/index.html

IBM Parallel Sysplex Aggregation
- http://www.ibm.com/servers/eserver/zseries/swprice/sysplex/

z/OS System Programmer's Guide to Sysplex Aggregation
- http://www.redbooks.ibm.com /redpapers/abstracts/redp3967.html

Tools from IBM Capacity Planning Support

- **IBM** http://w3.ibm.com/support/americas/wsc/cpsproducts.html
- **IBM BP** http://partners.boulder.ibm.com/src/atsmastr.nsf/WebIndex/PRS1762

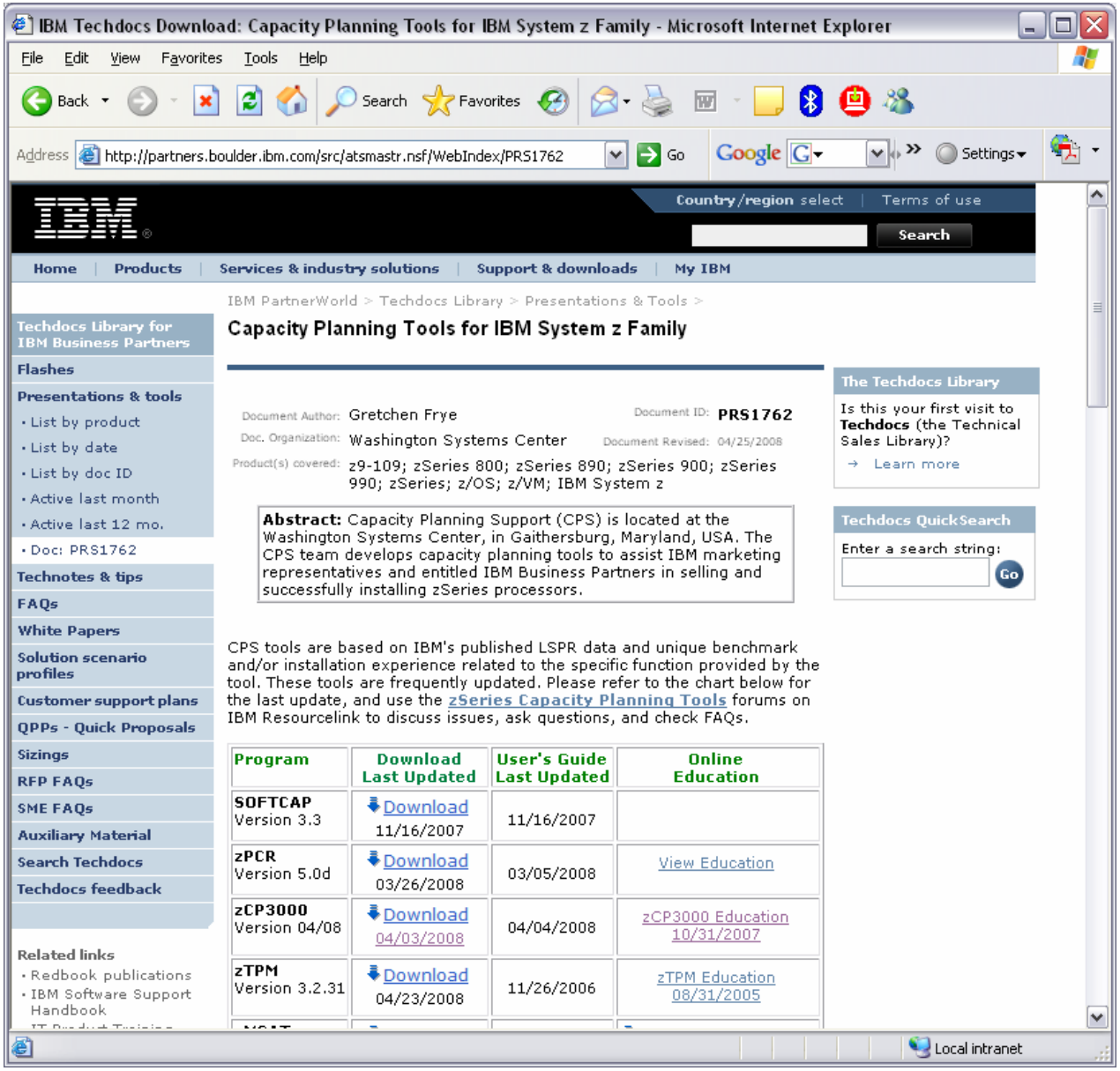
Where to get CPS Tools

IBM BP

http://partners.boulder.ibm.com/src/atsmastr.nsf/WebIndex/PRS1762

IBM

http://w3.ibm.com/support/americas/wsc/cpsproducts.html



Interest Areas for Development

- More Health Check Rules
- Shared Subchannel support
- System Managed Duplexing
- Add a system/more workload to an existing sysplex
- Move structures between CFs
- _____ ????