IBM Systems and Technology Group

Replacing Sysplex Timers:
Migrating to Server Time Protocol
in the Development Lab

z/OS Integration Test

06/17/08

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Agenda

STP Overview

- What is STP
- STP Terminology
- z/OS Integration Test Resources
- z/OS Integration Test Workload Mix
- Baseline - Data Center Sysplex Timer® Topology
- Planning and Availability Considerations

STP Migration Experiences

- Step through ETR to Mixed CTN migration experiences
  - ETR Timing Network (Sysplex Timer®) to a Mixed CTN Stratum 1 Timing Network
  - Mixed CTN Stratum 1 to Stratum 2 transition
  - Mixed CTN Stratum 2 to Stratum 1 transition
  - Mixed CTN transition back to ETR
- Step through ETR to STP-Only CTN Migration experiences
  - Migration from an ETR Timing Network to a Mixed-CTN,
  - Migration from a Mixed-CTN to an STP-Only CTN
  - Reverse Migration from an STP-Only CTN back to a Mixed CTN

Questions

What is STP?

- Message based time synchronization protocol
  - Based on Network Time Protocol (NTP) - an industry standard
  - Meets future, more stringent time synchronization requirements
- Uses Coupling links for time-message exchanges
  - Scales as processors and messaging technologies improve
  - Dedicated Timer links not required
- Allows GDPS distances to extend beyond the current 40 Km limit
  - Limits set by coupling protocol and links
- Implemented in zSeries z990, z890 & System z Licensed Internal Code (LIC)
  - Not available on 2064, 2066, 9672 Gx servers
  - Cannot replace the 9037 Sysplex Timer for earlier generations of servers
- Each system and CF in a STP Network capable of being a time server

STP Terminology

- STP-capable server/CF
  - Any server above the zSeries z900, z800 generation (type 2064,2066) with the STP Licensed Internal Code (LIC) installed
- STP-enabled server/CF
  - STP-capable server/CF with STP Feature Code 1021 installed
- STP-configured server/CF
  - STP-enabled server/CF with a CTN ID assigned
    - STP message exchanges can take place
- CTN - Coordinated Timing Network
  - Collection of servers that are time synchronized to a time value called Coordinated Server Time (CST)
    - *CTN ID - Servers / Coupling Facilities (CFs) that make up a CTN are all configured with a common identifier made up of "ETR Net ID" – "STP ID"*
    - *Mixed CTN - A* Mixed CTN *is one where the Sysplex Timer provides the timekeeping information to a heterogeneous mix of both ETR synchronized servers and servers that are synchronized with the Coordinated Server Time (CST).*
    - *STP-only CTN - All servers/CFs synchronized with CST which does not require a Sysplex Timer.*

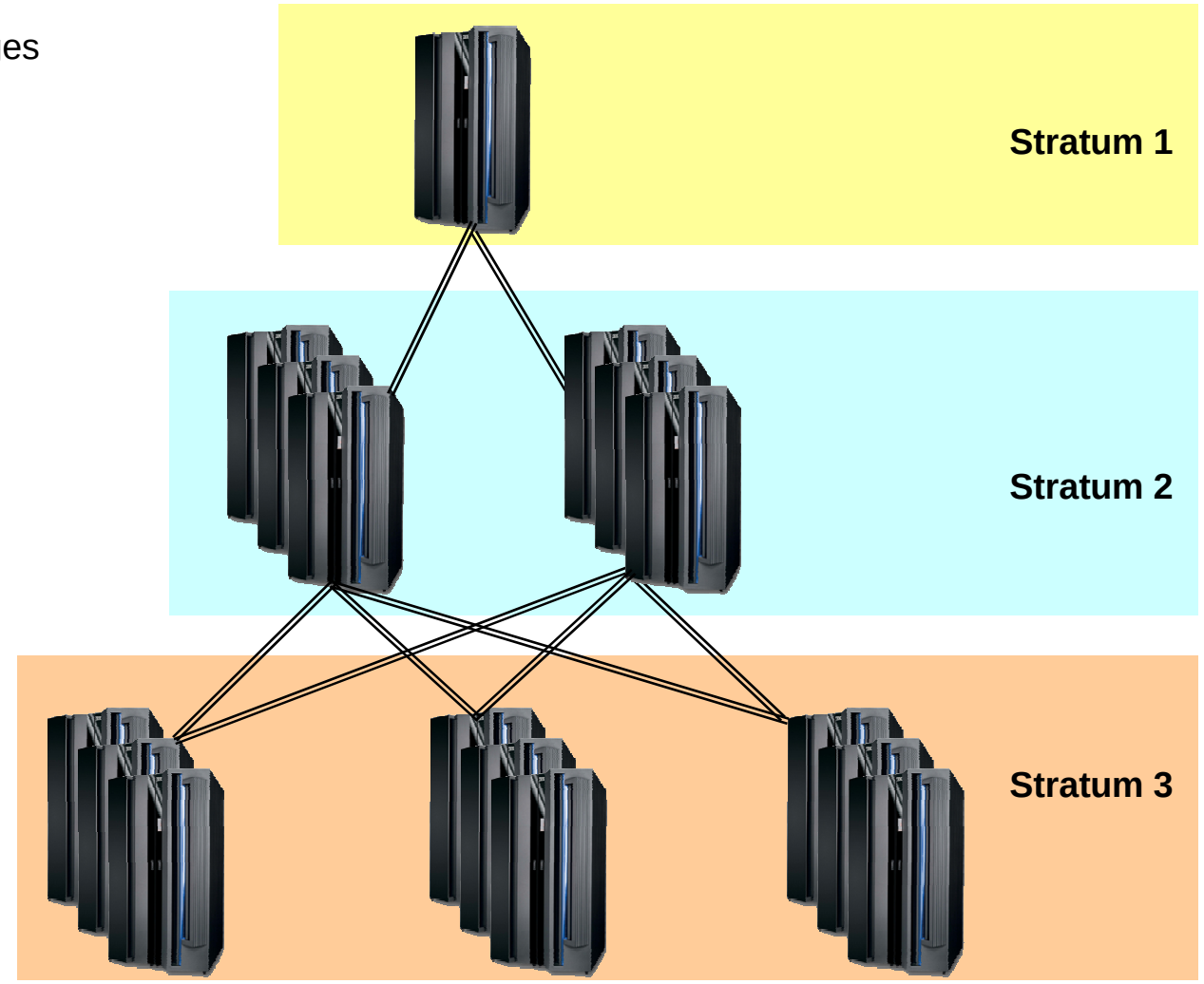
STP Terminology

- Stratum

  STP distributes time messages in layers, or stratums.

  The top layer, (Stratum 1) distributes time messages to the layer immediately below it (Stratum 2).

  Stratum 2 in turn distributes time messages to Stratum 3.



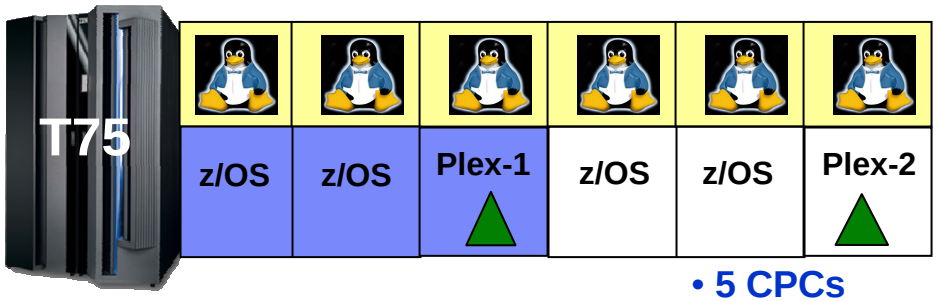
More about Mixed CTN

- Provides a concurrent migration path that supports legacy servers
  - Legacy servers will remain connected to Sysplex Timer
  - STP capable servers can be enabled and configured in a Mixed CTN using the same unique CTN ID.
  - Time Source for the Timing network will remain the Sysplex Timer
    - STP configured servers receiving timing signals from the Sysplex Timer are called Stratum 1 servers.
  - STP configured servers can be further configured to receive timing signals from one or more STP configured servers via existing coupling links
    - A stratum 2 server receives timing signals from a stratum 1 server
    - A stratum 3 server receives timing signals from a stratum 2 server
    - If CF links are not configured between 2 servers that require time synchronization, dedicated STP timing only links will need to be configured
- New servers can be added to the Parallel Sysplex without requiring additional ETR links
- Concurrent reverse migration to ETR Timing is supported
- Can extend GDPS support up to 100 Km, with certain configurations

More about STP-only CTN

- Replaces the Sysplex Timer completely
  - Legacy servers will not operate in the same Parallel Sysplex
  - All servers are STP configured using the same CTN ID.
  - Time Source for the Timing network will be a single stratum 1 server
    - Current Timer Server will be one of two servers assigned the following roles
      - Preferred Time Server
      - Optionally a Backup Time server in the case of PTS planned/unplanned outage
      - Optionally an Arbiter
  - All other servers are stratum 2 or stratum 3 and receive timing signals from the CTS via existing coupling links, including BTS and Arbiter
    - If CF links are not configured between 2 servers that require time synchronization, dedicated STP timing only links will need to be configured
- STP-only CTNs can be configured and initialized without a Sysplex Timer
- Concurrent migration is also supported, as well as concurrent reverse migration back to Mixed CTN
- Timer Operations are done solely from the Sysplex Time dialog on the HMC/SE for the CTS
- Can extend GDPS support up to 100 Km

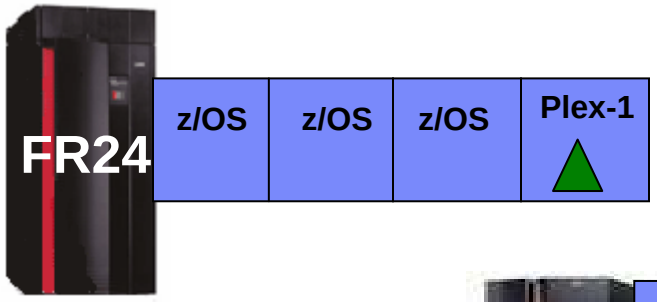
z/OS Integration Test Data Center Overview



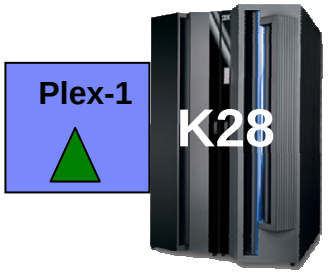
z9-EC: 2094-S38
392GB – 38CP

z9-BC : 2096-S07
16GB – 4 CP

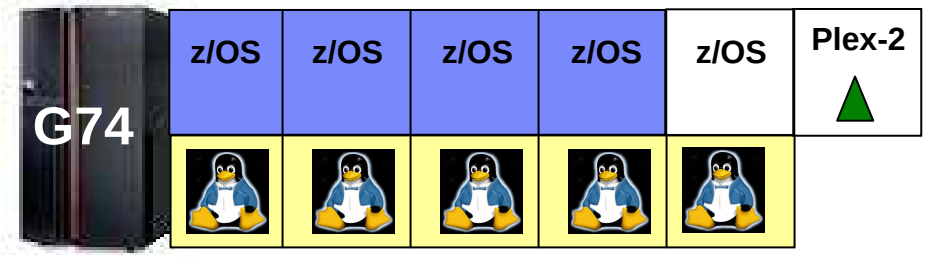
- 5 CPCs
- 13 z/OS® Servers
- 11 Linux© Images
- 5 ICFs
  - 2 Parallel Sysplexes®
  - CF Duplexing
- Two 9037 Sysplex© Timers
- Storage
  - ESS, DS6000, DS8000, TS3500



z900 : 2064-212
32GB – 16CP

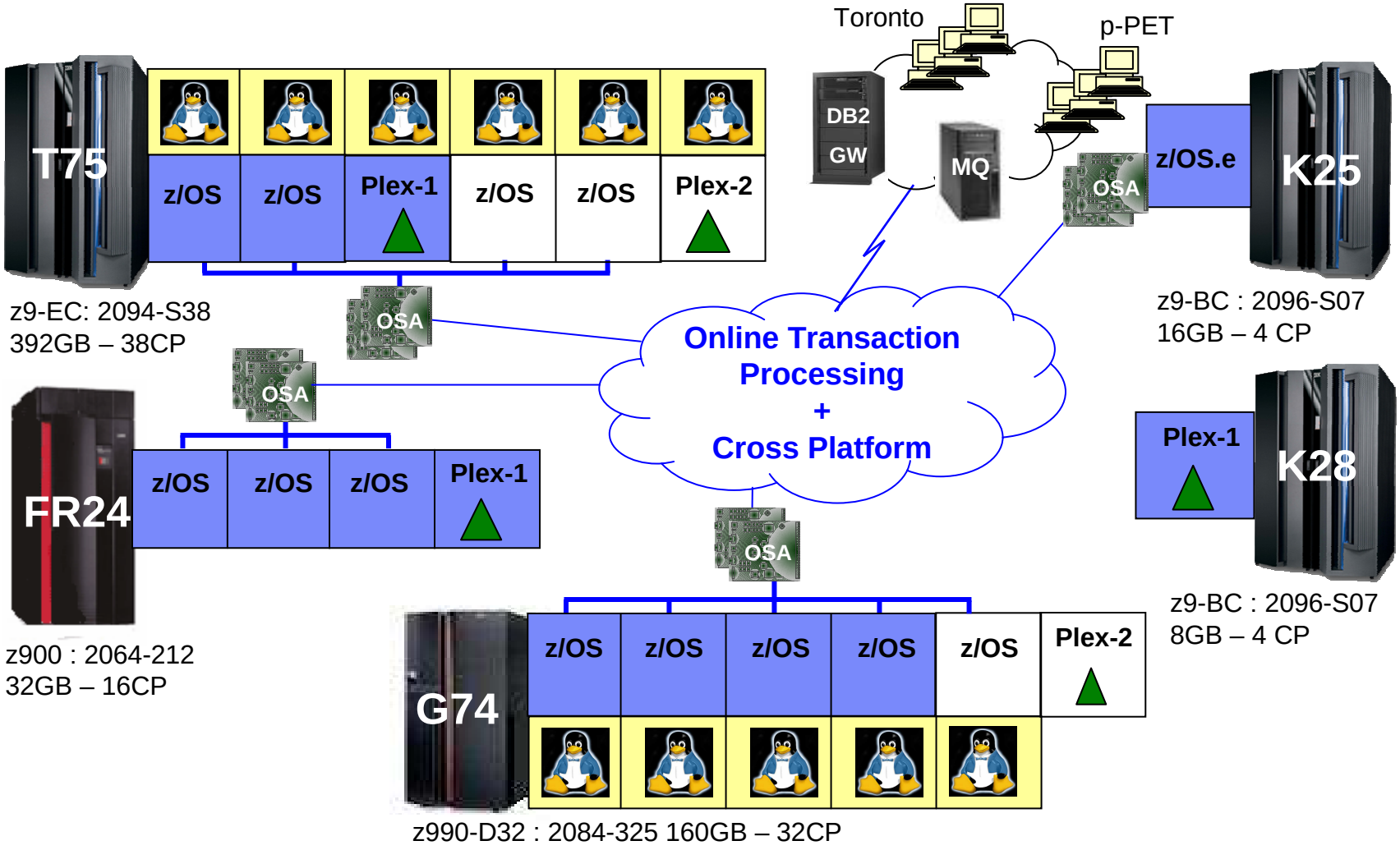


z9-BC : 2096-S07
8GB – 4 CP

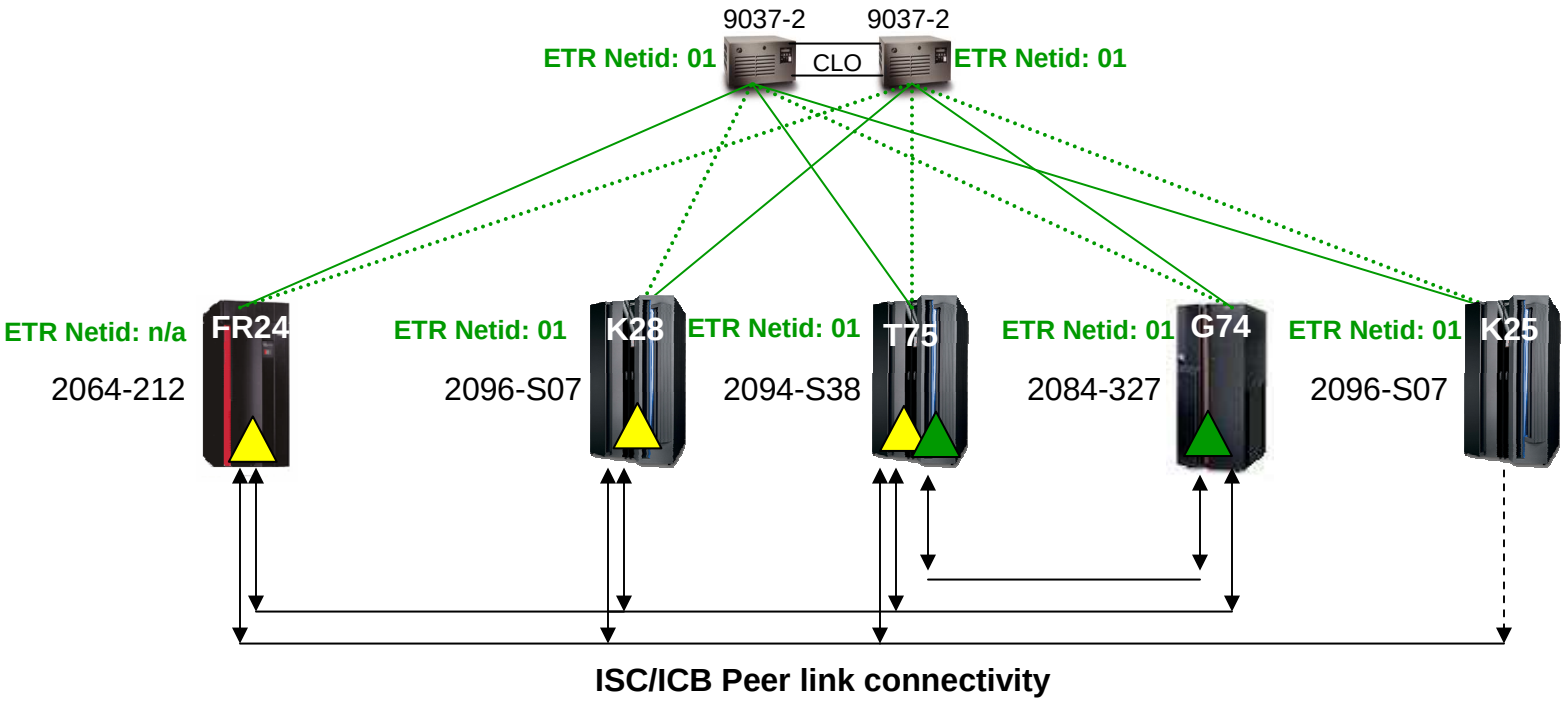


z990-D32 : 2084-325 160GB – 32CP

z/OS Integration Test Data Center
Workload Mix



z/OS Integration Test Data Center
Sysplex Timer® Topology



z/OS Messages with ETR Timing Networks

- Pre – R7
  - **D ETR**

```
-D ETR
 IEA282I 10.32.29 ETR STATUS 245
 SYNCHRONIZATION MODE = ETR
   CPC PORT 0          ACTIVE ==>   CPC PORT 1
   OPERATIONAL                      OPERATIONAL
   ENABLED                          ENABLED
   ETR NET ID=00                    ETR NET ID=00
   ETR PORT=07                      ETR PORT=07
   ETR ID=00                        ETR ID=01
```

  - **D XCF,SYSPLEX,ALL**

IXC335I 10.34.20 DISPLAY XCF 547

SYSTEM	TYPE	SERIAL	LPAR	STATUS	TIME	**SYSTEM STATUS**
ST1	2094	81FC	04		09/06/2006 10:34:20	**ACTIVE**
ST8	2064	1514	07		09/06/2006 10:34:15	ACTIVE
ST7	2064	1514	06		09/06/2006 10:34:15	ACTIVE
ST4	2064	1514	02		09/06/2006 10:34:15	ACTIVE
ST6	2094	81FC	0D		09/06/2006 10:34:17	ACTIVE
ST3	2096	432D	11		09/06/2006 10:34:18	ACTIVE
ST5	2094	81FC	02		09/06/2006 10:34:15	ACTIVE
TP3	2064	1514	04		09/06/2006 10:34:16	ACTIVE
ST2	2094	81FC	0C		09/06/2006 10:34:16	ACTIVE

z/OS Messages with ETR Timing Networks

- R7
  - **D ETR remains the same**
  - **D XCF,SYSPLEX,ALL**

```
-D XCF,S,ALL
IXC335I  11.02.37  DISPLAY XCF 141
SYSTEM   TYPE SERIAL LPAR STATUS TIME                 SYSTEM STATUS
TPN            2064  1526     09      09/06/2006 11:02:36  ACTIVE      TM=ETR
JB0            2084  B52A     01      09/06/2006 11:02:34  ACTIVE      TM=ETR
Z0             2064  1526     01      09/06/2006 11:02:34  ACTIVE      TM=ETR
JA0            2084  B52A     2A      09/06/2006 11:02:35  ACTIVE      TM=ETR
J90            2064  1526     05      09/06/2006 11:02:33  ACTIVE      TM=ETR
JE0            2084  B52A     22      09/06/2006 11:02:35  ACTIVE      TM=ETR
J80            2094  299E     07      09/06/2006 11:02:36  ACTIVE      TM=STP
JF0            2094  299E     06      09/06/2006 11:02:33  ACTIVE      TM=STP
JC0            2084  B52A     0C      09/06/2006 11:02:33  ACTIVE      TM=ETR
JH0            2096  FE2D     01      09/06/2006 11:02:35  ACTIVE      TM=ETR
```

Planning and Availability

Planning

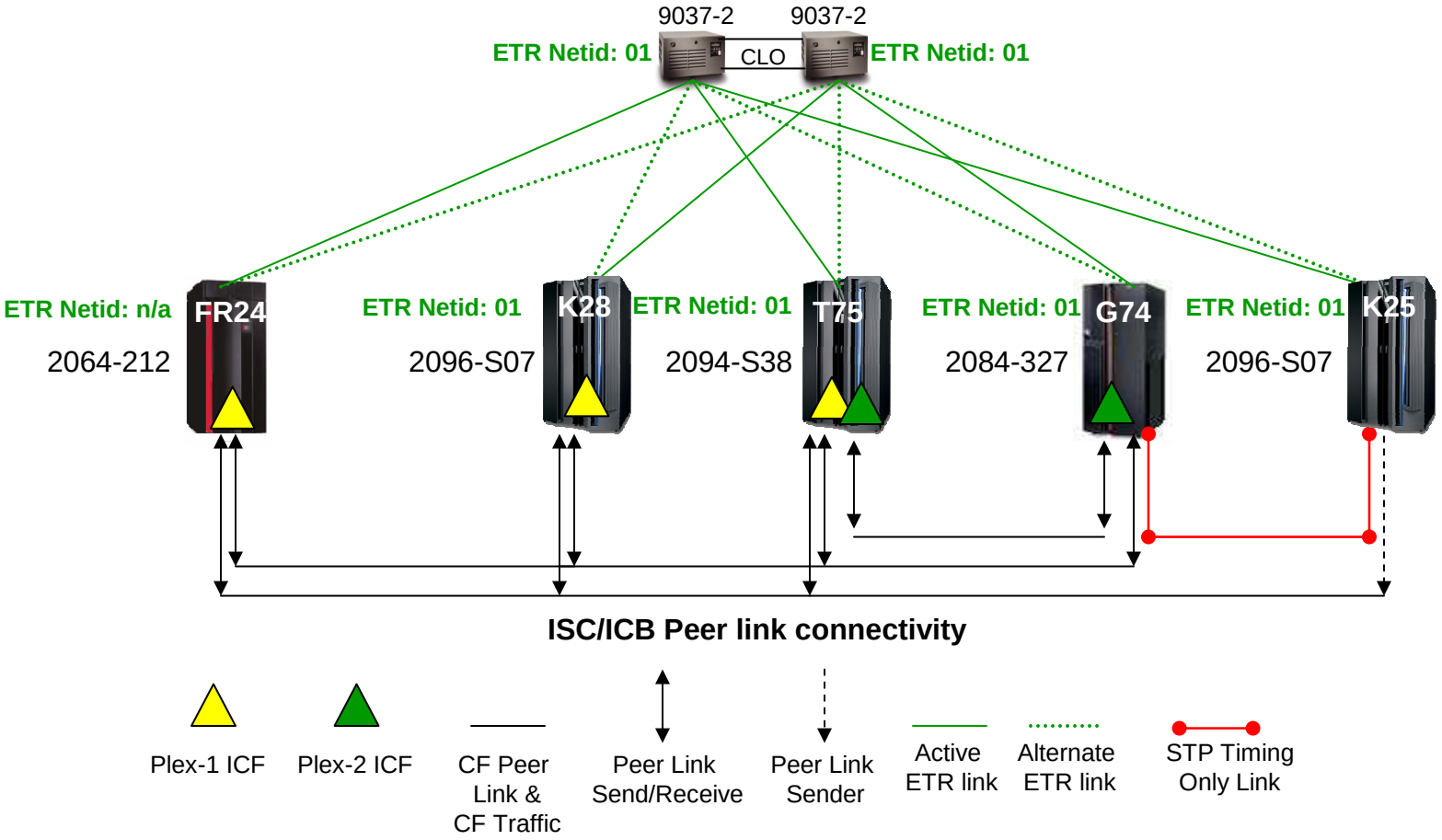
- System Assurance Product Review
- We relied on the IBM® Redbook, *Server Time Protocol Planning Guide* SG24-7280

Availability

- At no point would a single point of failure exposure be tolerated by our team.
- Each migration step had to ensure that equal, or better, timer resiliency would be maintained.
- STP timing-only links were needed to close one such exposure
  - *STP timing only links are coupling peer links that allow two servers to be synchronized using STP messages, when a CF does not exist at either end of the peer link.*

Planning and Availability
STP timing-only links

All STP-enabled CPCs now have fully redundant peer link connectivity to every other STP-enabled CPC in the data center (via STP timing-only links, or via CF Peer links)

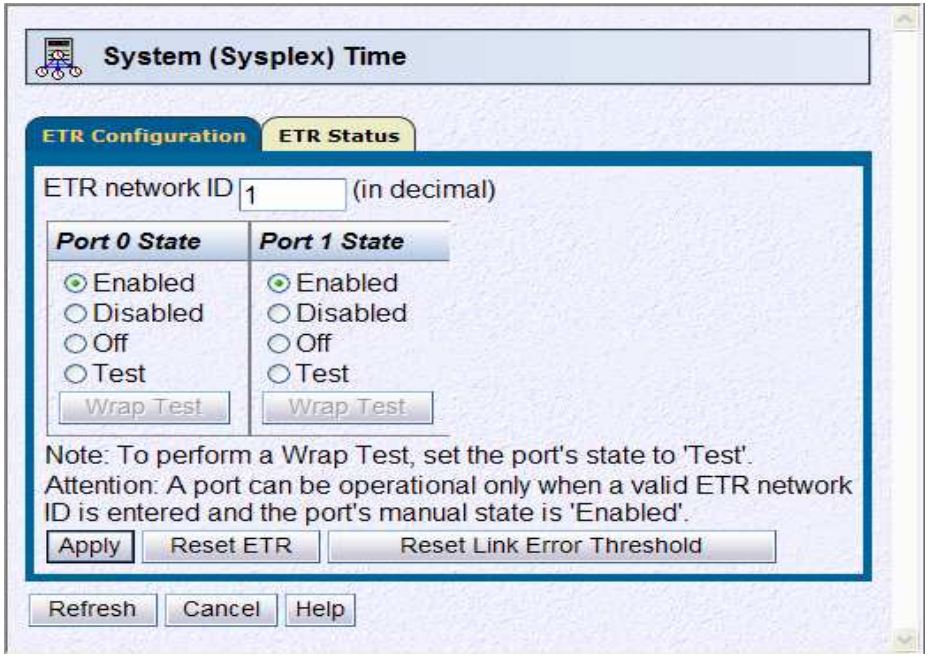


STP Migration Experiences

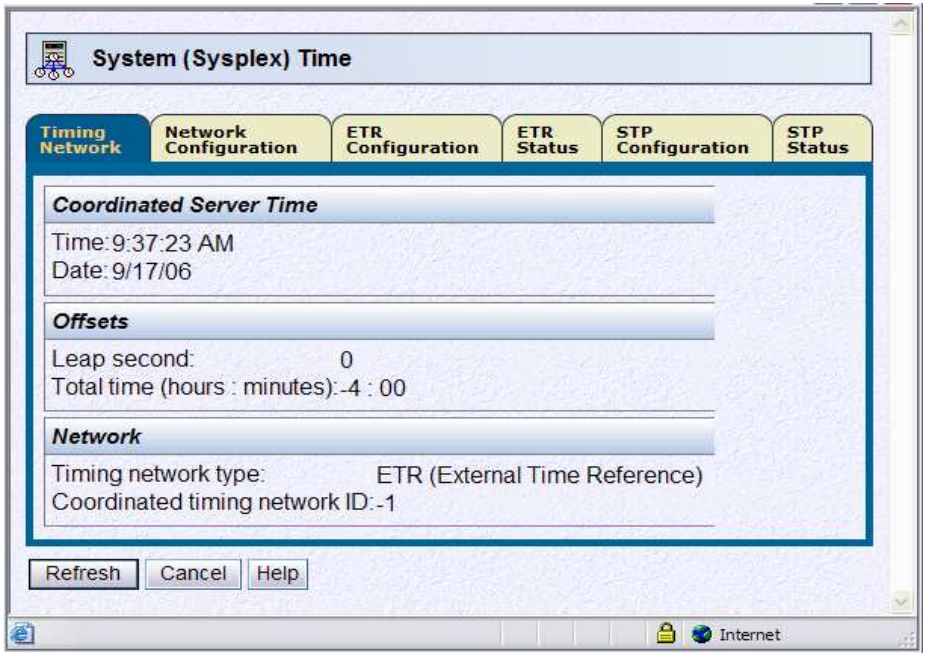
HMC/SE System (Sysplex) Time Task

There are now a total of six tabs that can be displayed on the System (Sysplex) Time panel.

Without the STP feature installed



All six tabs are displayed only if the server (CPC) has at least one External Time Reference (ETR) card installed and the STP feature is installed

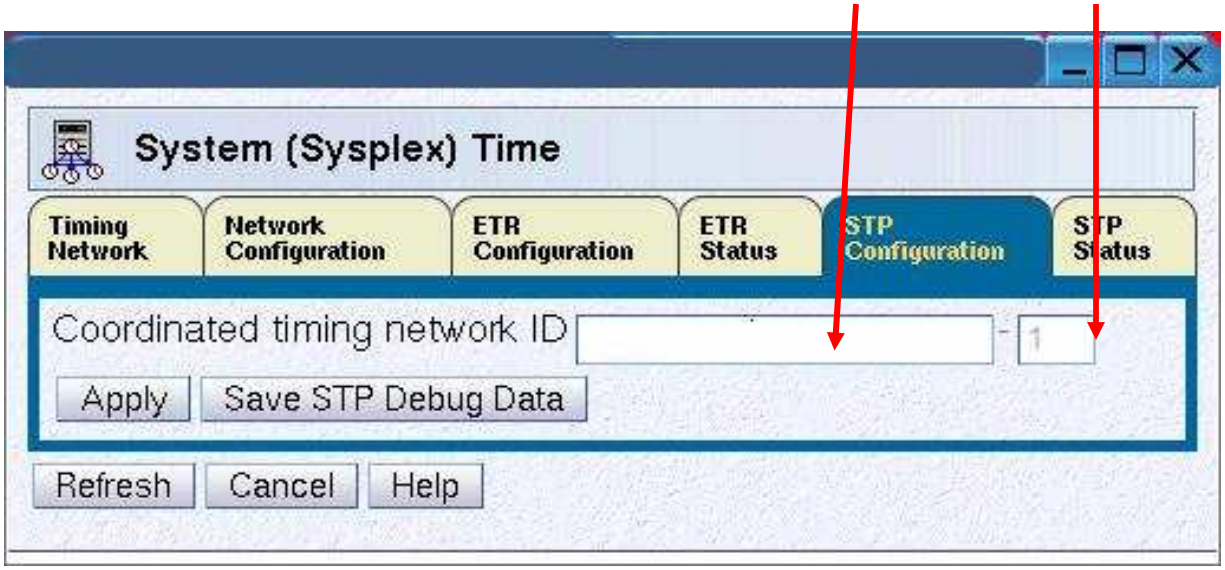


CTN ID Configuration & Verification

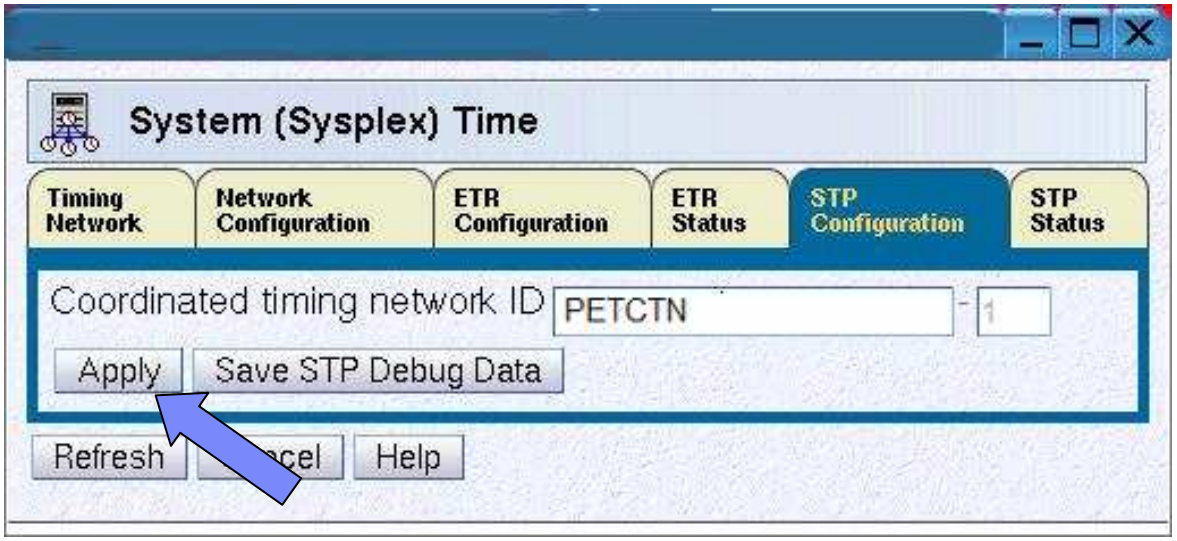
Coordinated Timing Network Identification (CTN ID)

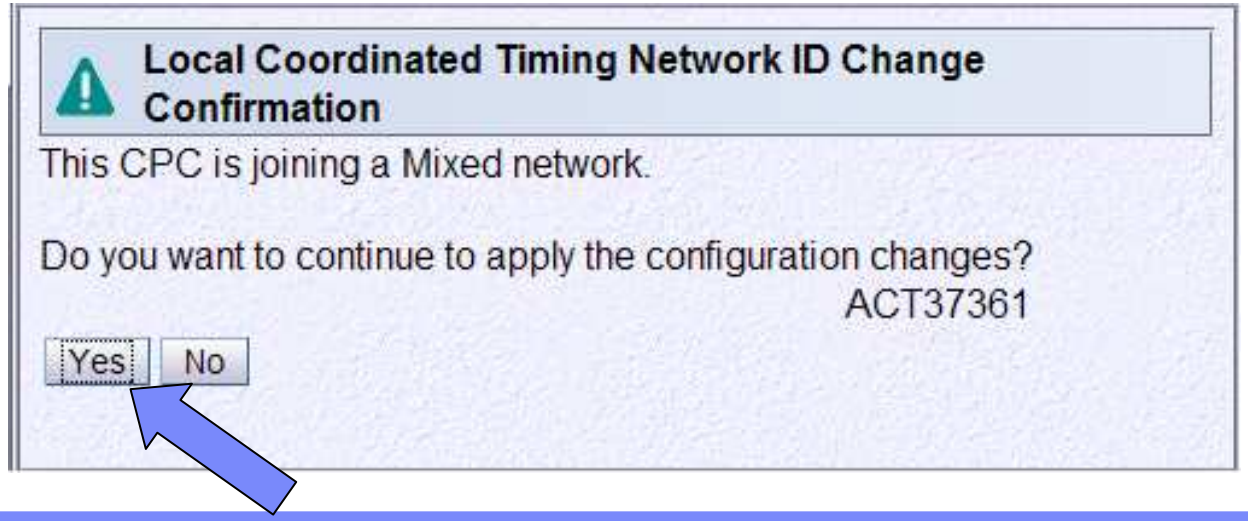
Involves defining a matching CTN ID on each STP-enabled CPC.

- The System (Sysplex) Time task's STP Configuration panel is used to configure the CTN ID
- The CTN ID is comprised of two fields in the form of **STP ID** – **ETR Netid**.

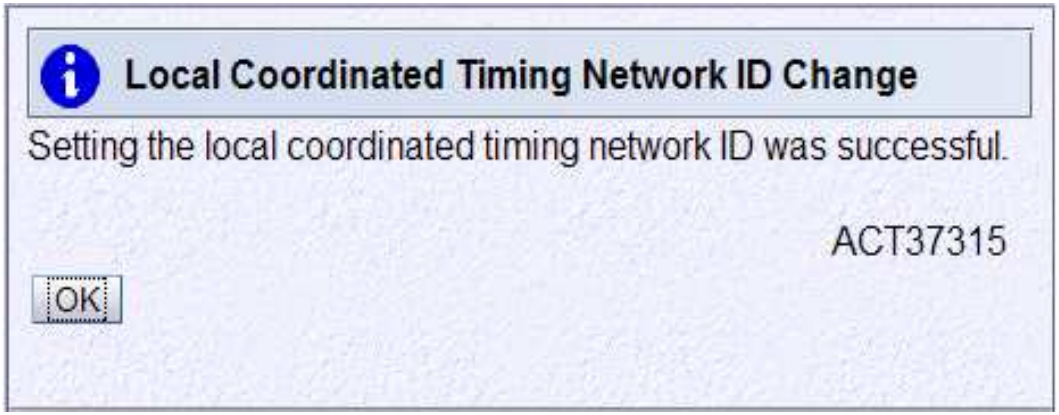


CTN ID Configuration & Verification





CTN ID Configuration Verification



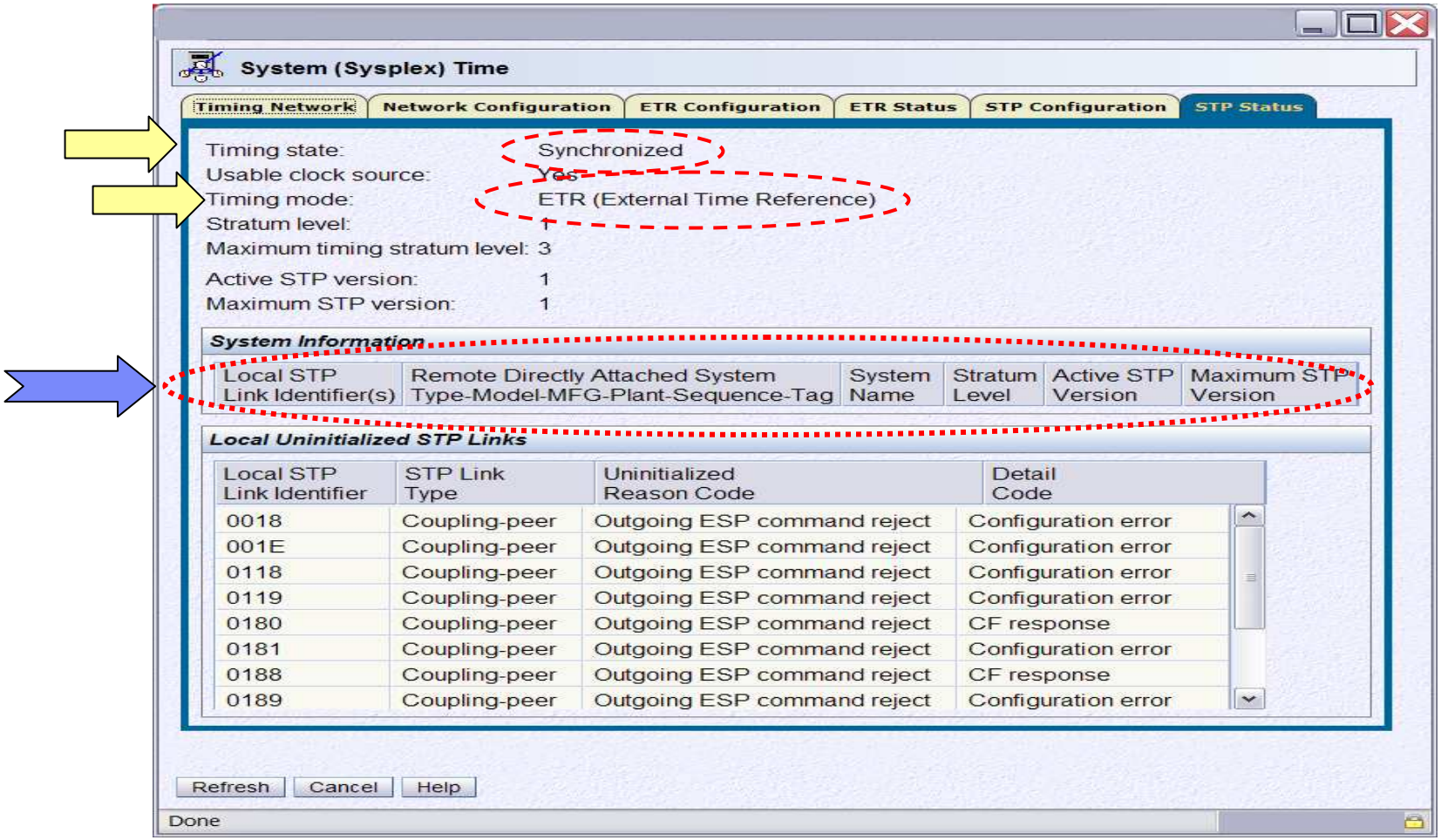
Unsolicited z/OS® acknowledgment message

IXC438I COORDINATED TIMING INFORMATION HAS BEEN UPDATED
FOR SYSTEM: JH0
PREVIOUS ETR NETID: 01
CURRENT CTNID: PETCTN -01

Solicited via D ETR

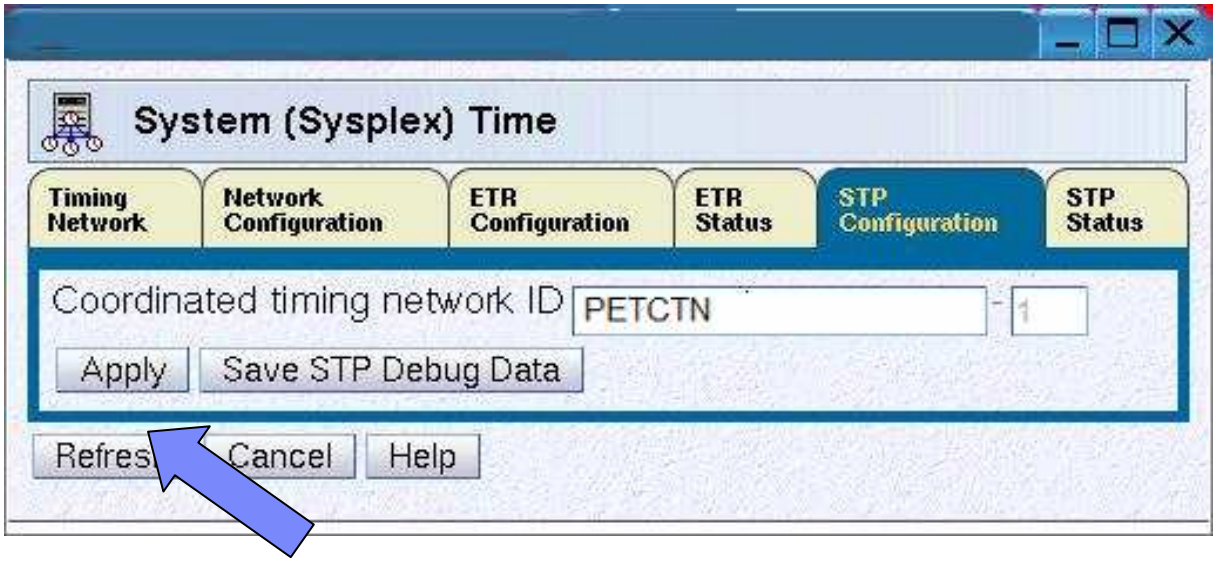
```
IEA282I 11.24.16 TIMING STATUS
SYNCHRONIZATION MODE = ETR
CPC PORT 0   <==ACTIVE          CPC PORT 1
OPERATIONAL                     OPERATIONAL
ENABLED                         ENABLED
ETRNETID=01                      ETR NETID=01
ETRPORT=04                       ETR PORT=04
ETR ID=00                       ETR ID=01
THIS SERVER IS PART OFTIMING NETWORK PETCTN  -01
```

STP Status - System (Sysplex) Time Task



STP Configuration Panel

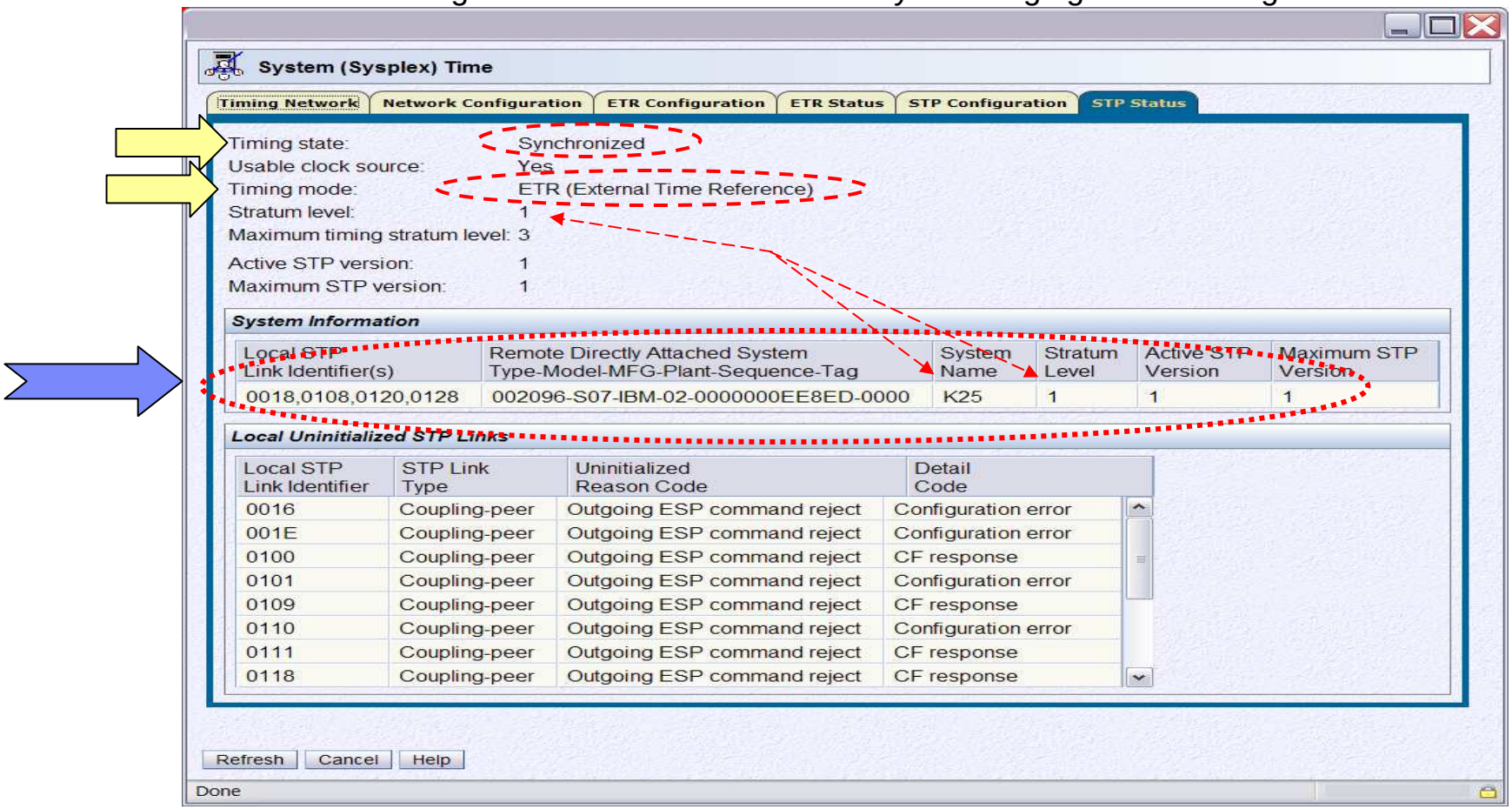
Configure a matching CTN ID on a second STP-enabled CPC



STP Status – Two Configured CPCs

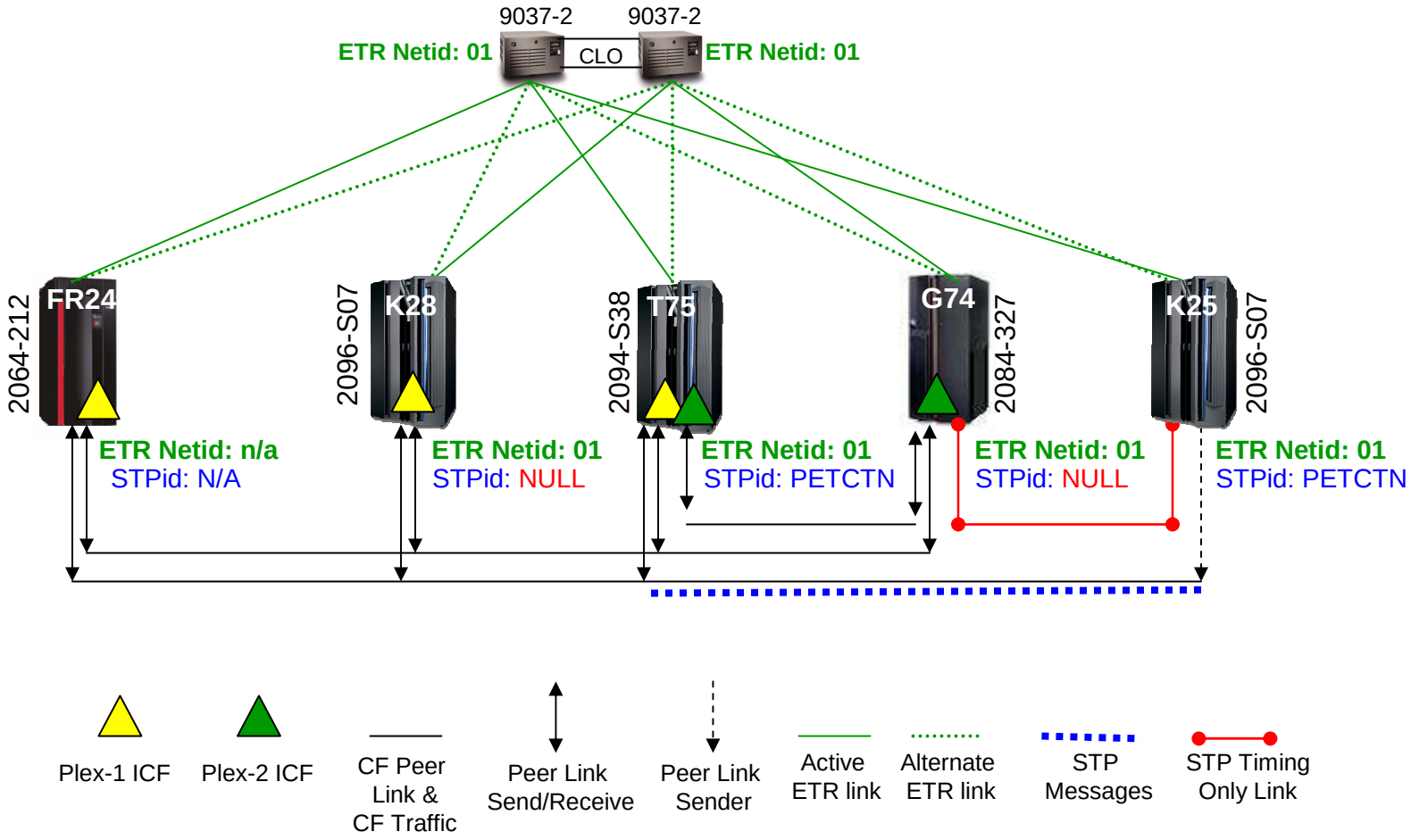
This CPC maintains timing synchronization provided by the Sysplex Timers®

Two CPCs with matching CTN IDs are now successfully exchanging STP messages over 4 links



Mixed CTN Topology
2 STP-configured CPCs

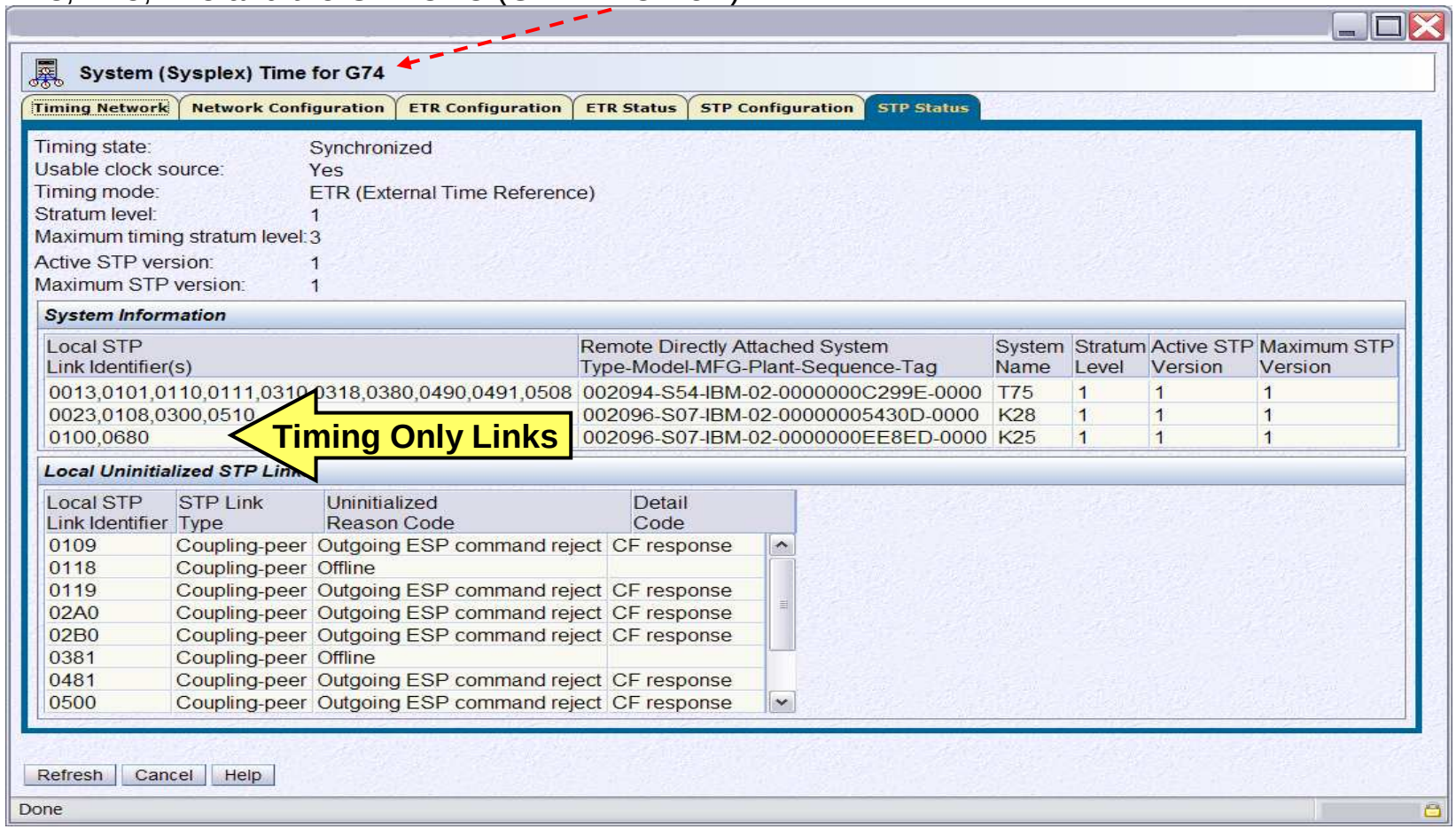
STP signals are now being exchanged over existing CF peer links between the T75 and K25 CPCs



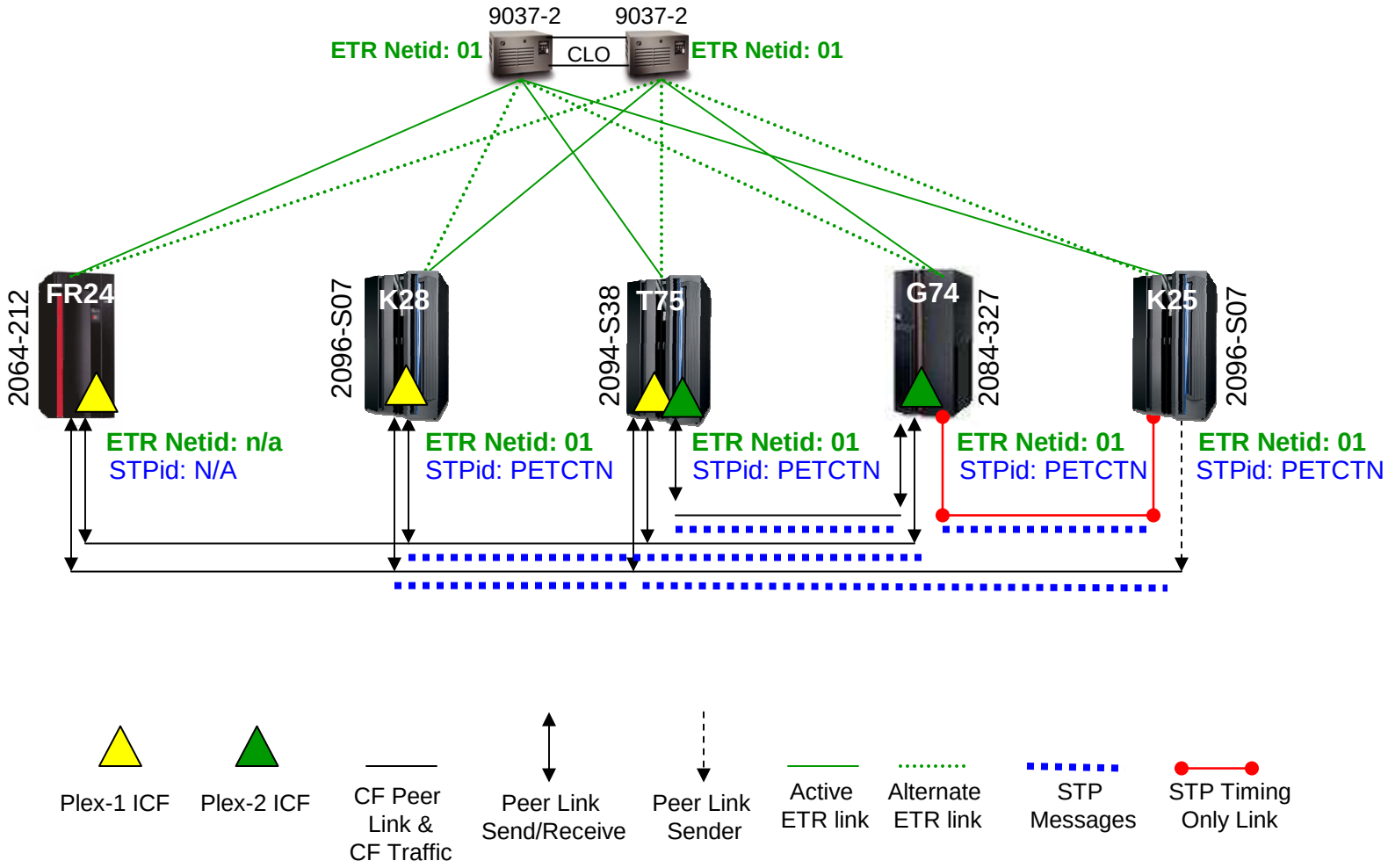
Lather, Rinse, Repeat…

All 4 of the STP-capable CPCs in the data center have now been successfully configured

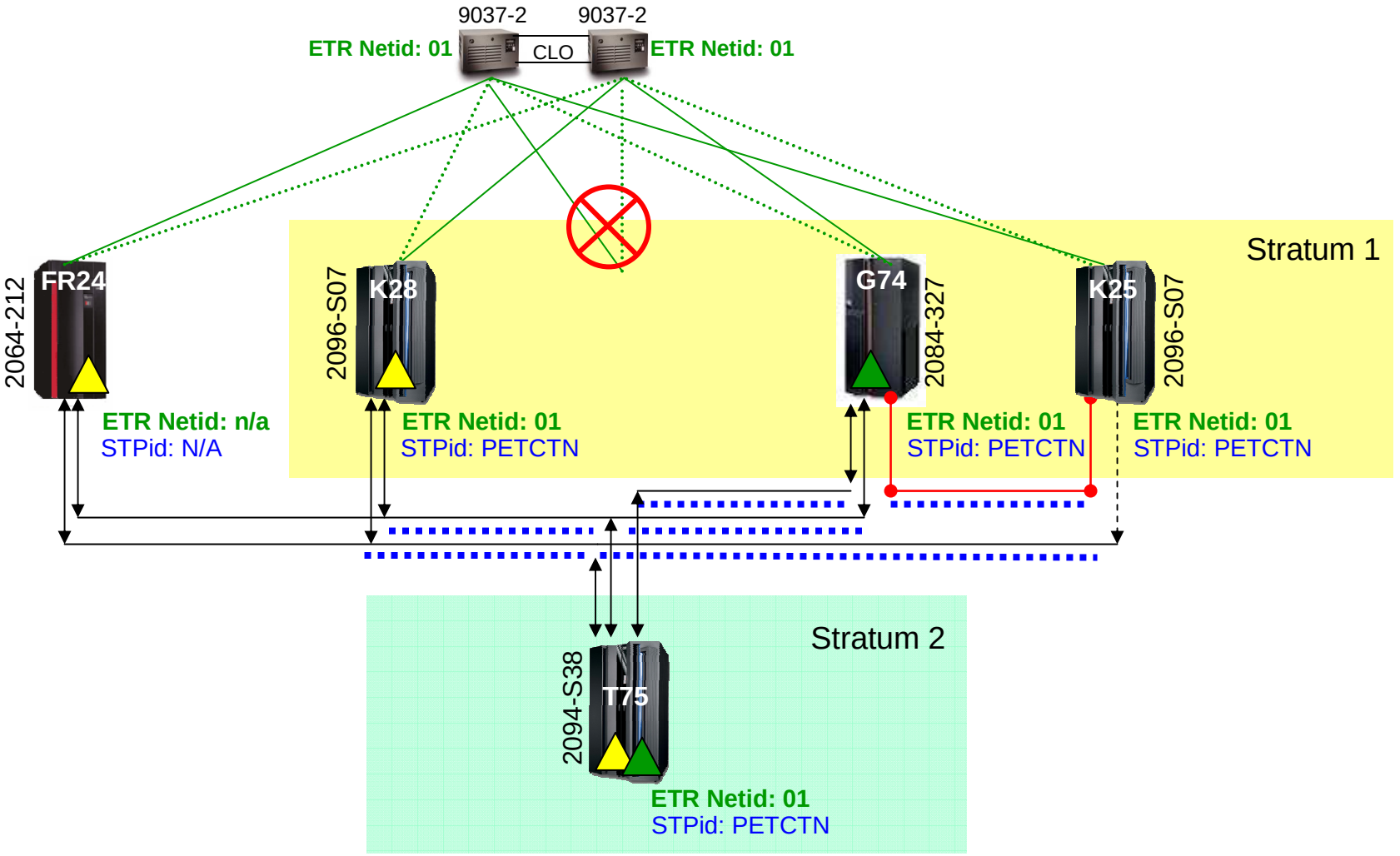
K28, K25, T75 and the G74 CPC (G74 HMC view)



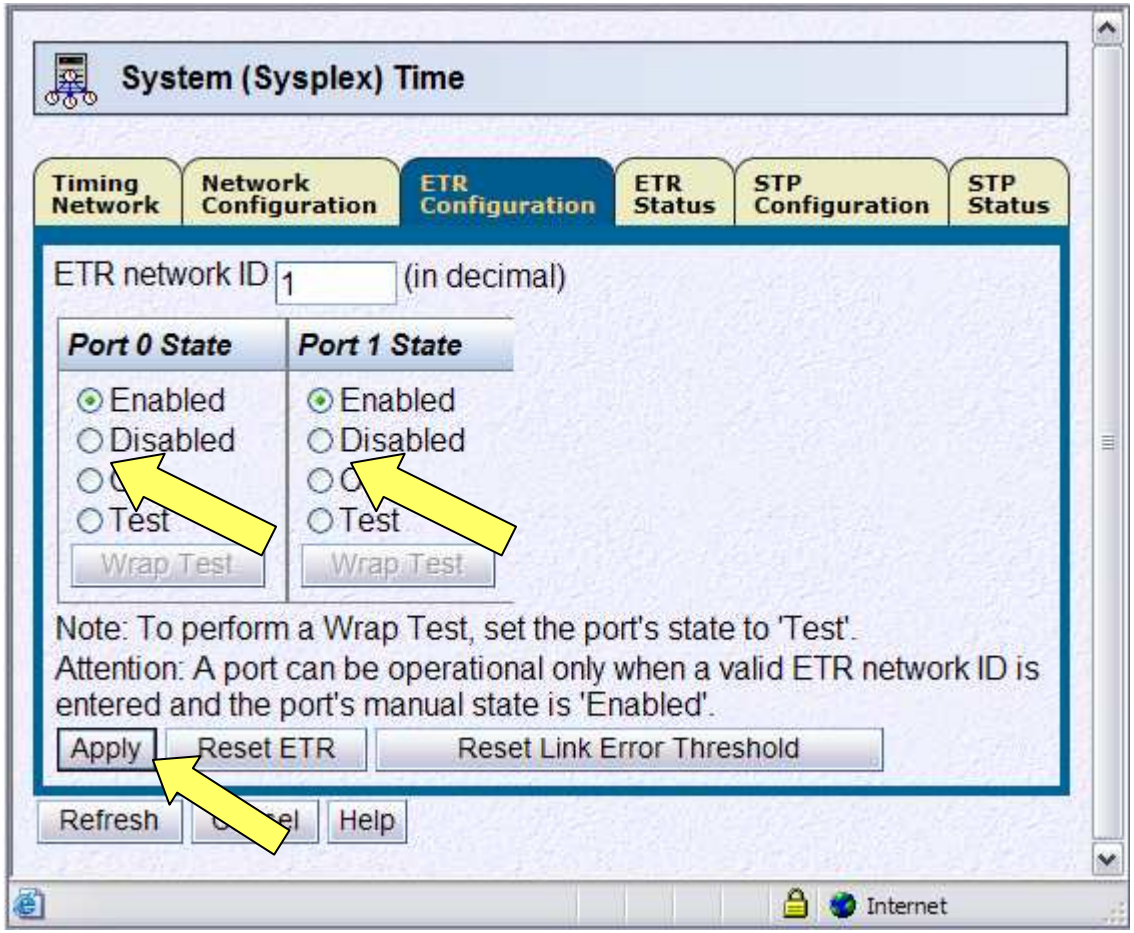
Mixed CTN Topology
4 STP-configured CPCs



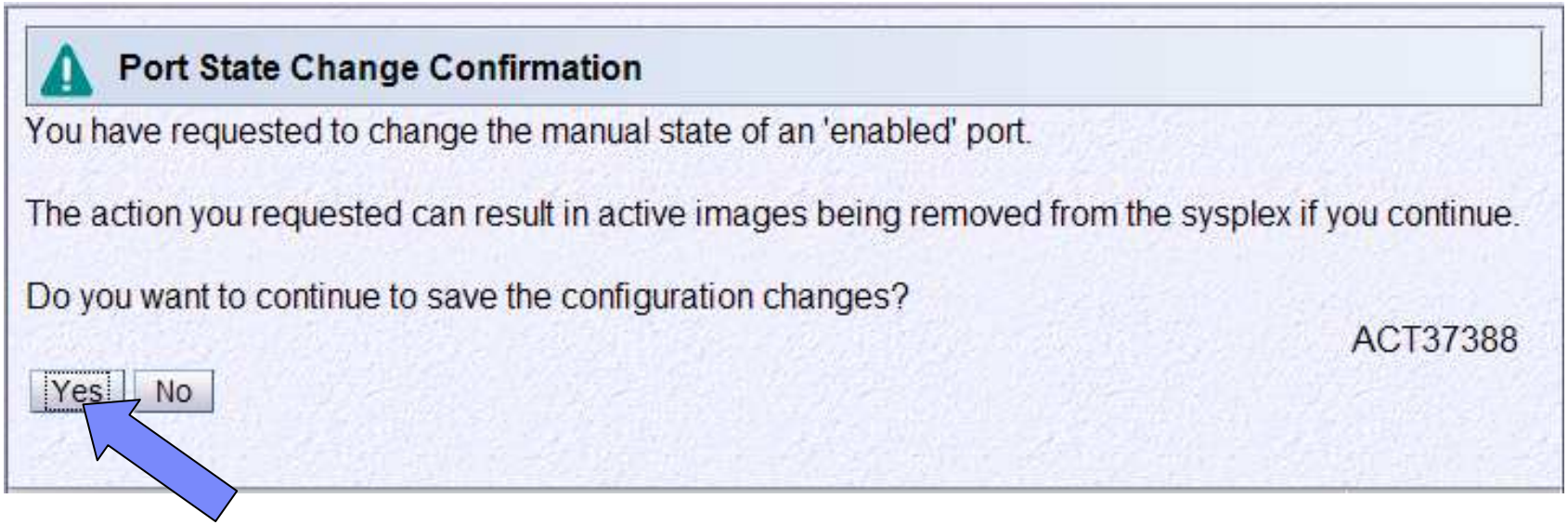
Mixed CTN Topology
Stratum 1 to Stratum 2 Transition



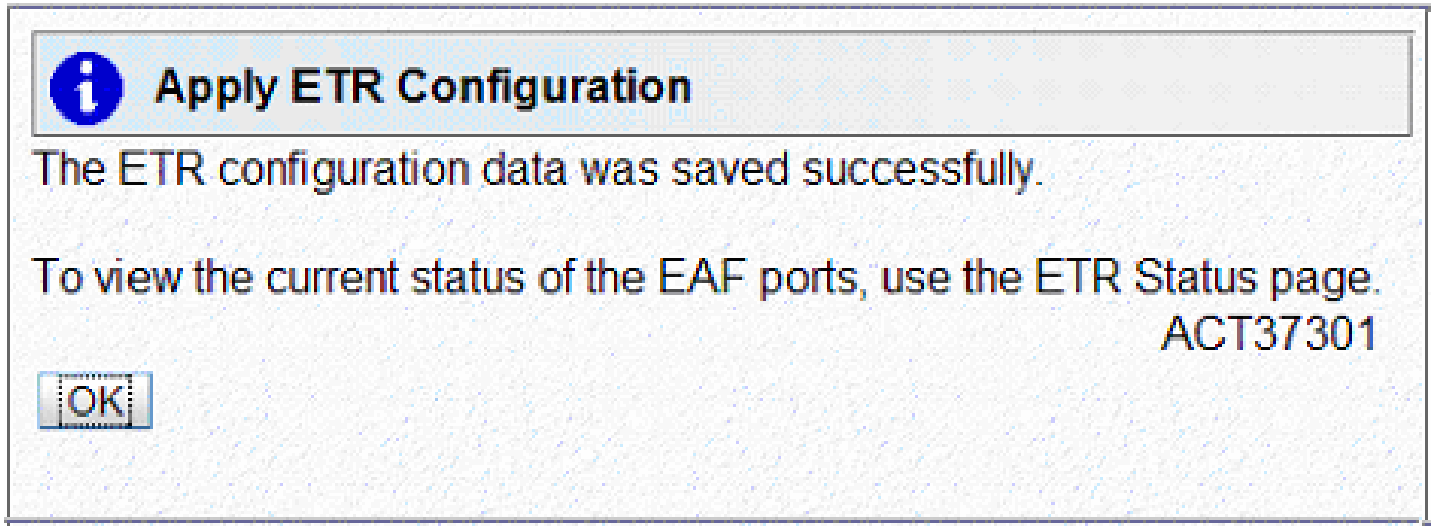
Mixed CTN Topology
Stratum 1 to Stratum 2 Transition



Mixed CTN Topology
Stratum 1 to Stratum 2 Transition



Mixed CTN Topology
Stratum 1 to Stratum 2 Transition



z/OS® images residing on the CPC where the ETR ports were disabled will post messages IEA393I and IEA380I

```
15:08:49.64 *IEA393I ETR PORT 0 IS NOT OPERATIONAL.  THIS MAY BE A CTN
             CONFIGURATION CHANGE.
15:08:49.64  *IEA393I ETR PORT 1 IS NOT OPERATIONAL.  THIS MAY BE A CTN
              CONFIGURATION CHANGE.
15:08:49.64    IEA380I THIS SYSTEM IS NOW OPERATING IN STP TIMING MODE.
```

z/OS Message ID Changed

The “Display ETR” (D ETR) command issued on any of the z/OS® images residing on the T75 CPC confirmed that they were operating on a Stratum 2 CPC

D ETR
IEA386I 15.38.10 TIMING STATUS 798
SYNCHRONIZATION MODE = STP
THIS SERVER IS A STRATUM 2
CTNID = PETCTN -01
NUMBER OF USABLE TIMING LINKS = 17

It is important to note that the z/OS® message ID returned from the D ETR command has changed from **IEA282I** to **IEA386I when STP is configured on a CPC**. (May be a planning consideration for any automation product that keys off of this message ID).

In addition, the SYNCHRONIZATION MODE reflects that the CPC is now synchronized to the STP facility.

The rest of message IEA386I describes timing network information, such as the Stratum, the CTN ID and the number of usable peer links that the CPC is receiving timing signals over.

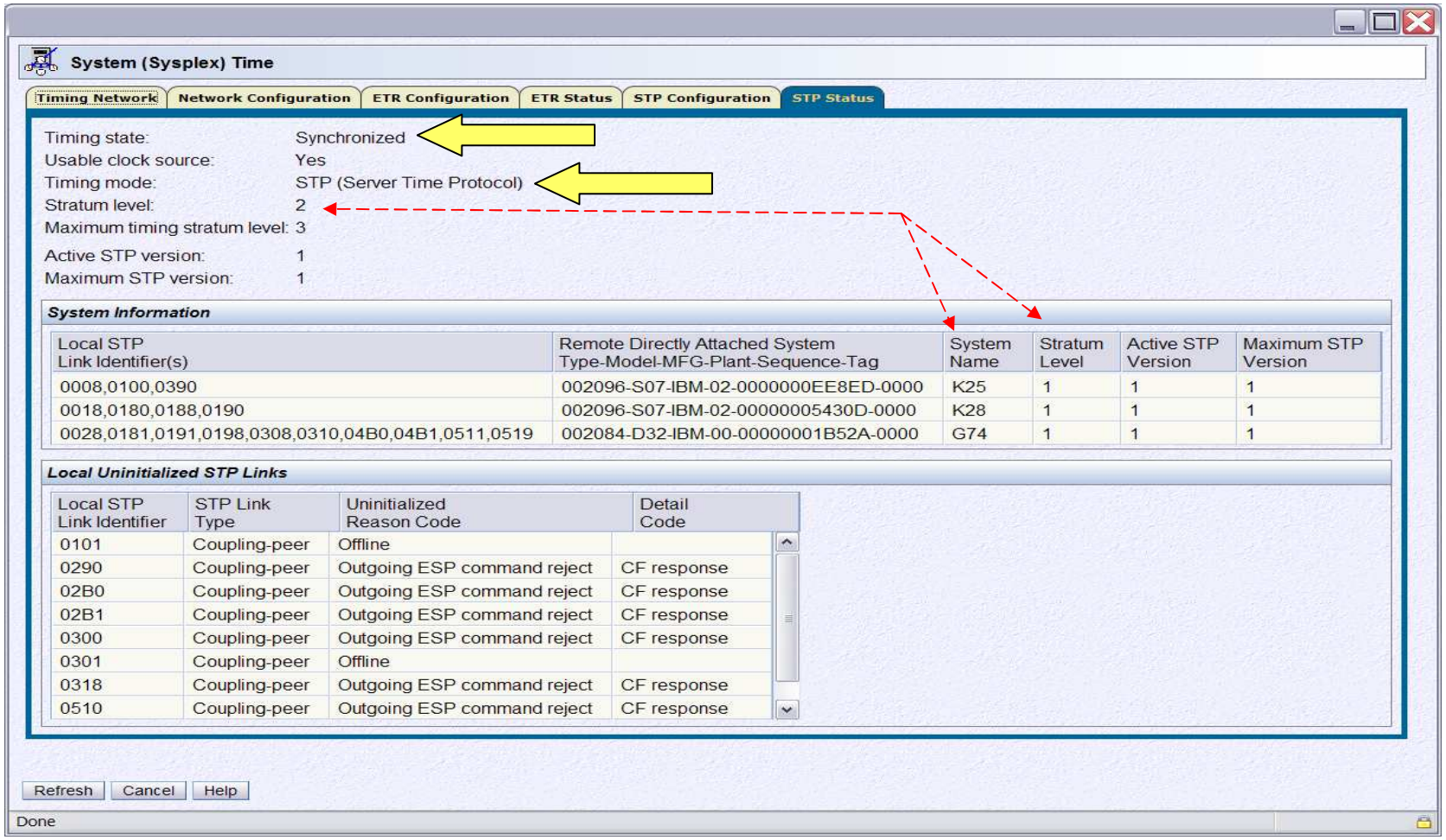
z/OS Message Enhanced

Issuing the z/OS "Display,XCF,Sysplex,All" command on any z/OS® image in the sysplex will also show that all of the z/OS® images operating on the T75 CPC have a Timing Mode (**TM=**) of **STP**.

D XCF,S,ALL
IXC335I 10.45.43 DISPLAY XCF 529

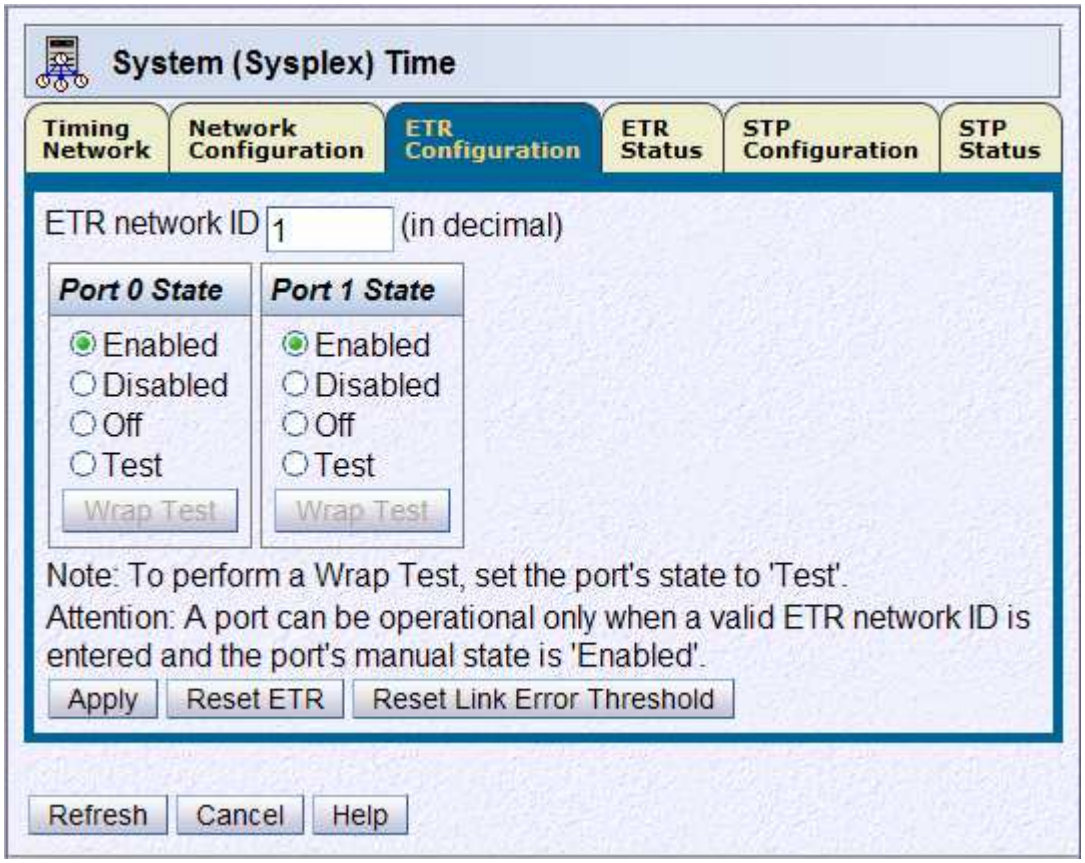
SYSTEM	TYPE	SERIAL	LPAR	STATUS	TIME	SYSTEM STATUS	
TPN	2064	1526	09	08/26/2006 10:45:38	ACTIVE	TM=ETR	
J80	2094	299E	07	08/26/2006 10:45:43	ACTIVE	**TM=STP**	
JC0	2084	B52A	0C	08/26/2006 10:45:38	ACTIVE	TM=ETR	
Z0	2064	1526	01	08/26/2006 10:45:40	ACTIVE	TM=ETR	
JA0	2084	B52A	2A	08/26/2006 10:45:40	ACTIVE	TM=ETR	
JB0	2084	B52A	01	08/26/2006 10:45:38	ACTIVE	TM=ETR	
J90	2064	1526	05	08/26/2006 10:45:38	ACTIVE	TM=ETR	
JH0	2096	FE2D	01	08/26/2006 10:45:40	ACTIVE	TM=ETR	
JF0	2094	299E	06	08/26/2006 10:45:40	ACTIVE	**TM=STP**	
JE0	2084	B52A	22	08/26/2006 10:45:40	ACTIVE	TM=ETR	

STP Status Panel Verifications



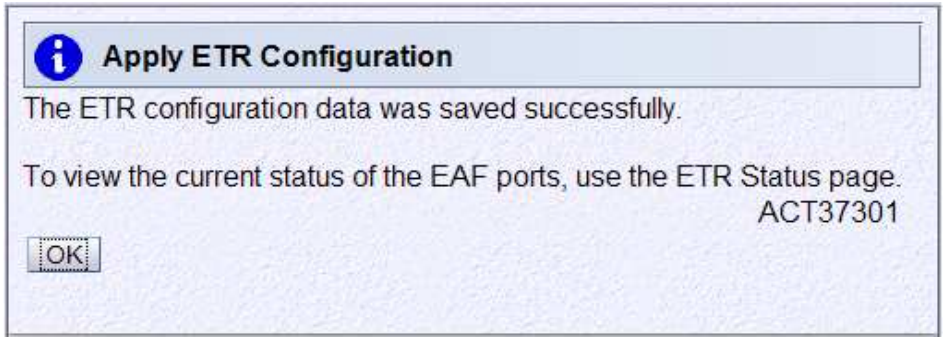
Mixed CTN Topology
Stratum 2 to Stratum 1 Transition

The ETR Configuration panel is used to enable the ETR ports



Mixed CTN Topology
Stratum 2 to Stratum 1 Transition

A panel confirming that the ETR ports were successfully enabled is then displayed

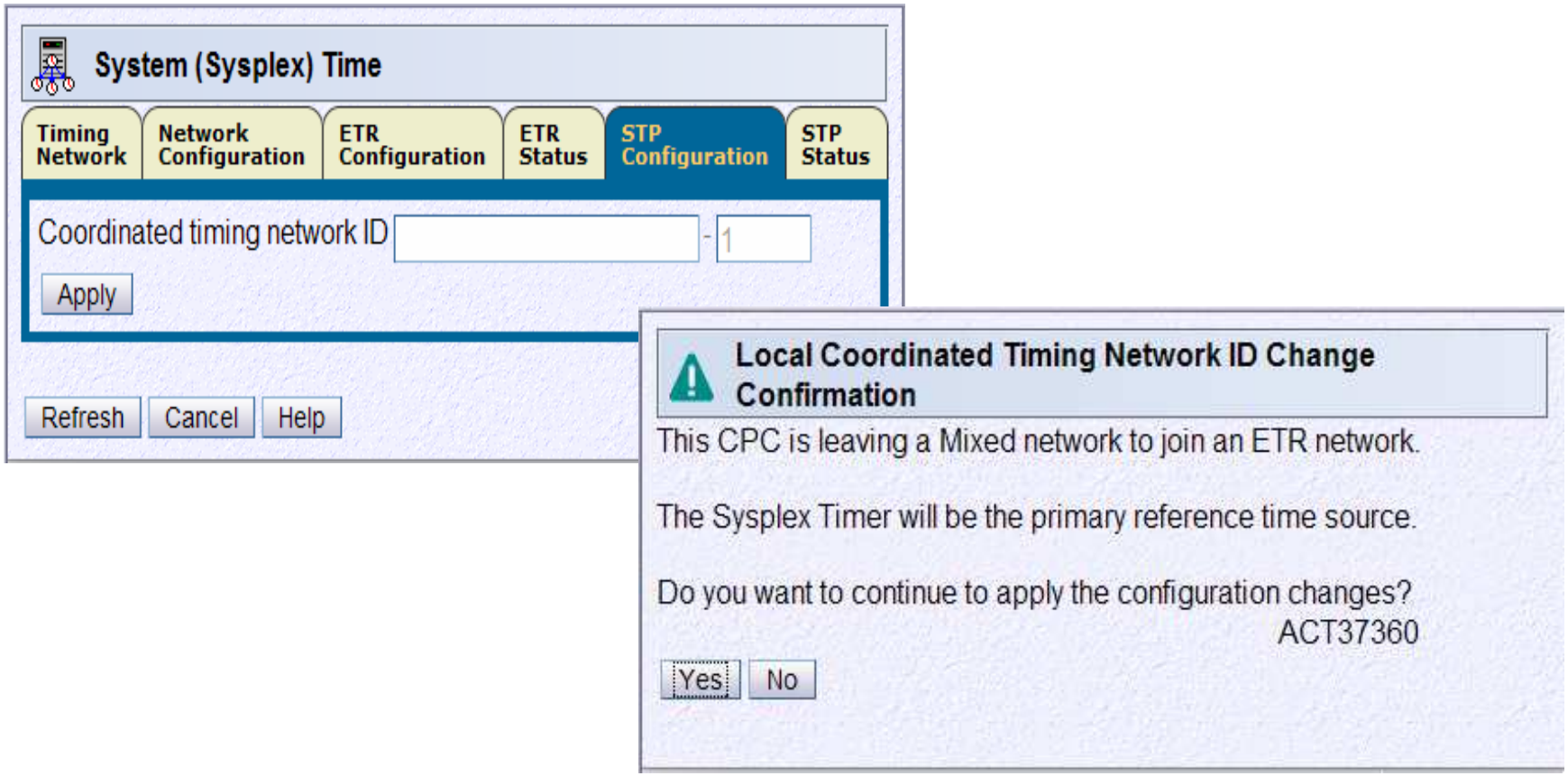


z/OS images residing on the respective CPC will post a message for each ETR port that has been enabled

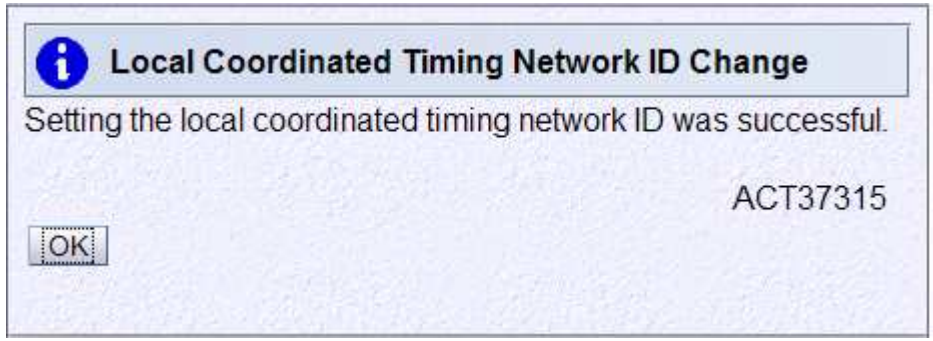
IEA267I ETR PORT 0 IS NOW AVAILABLE.
IEA267I ETR PORT 1 IS NOW AVAILABLE.
IEA260I THE CPC IS NOW OPERATING IN ETR MODE.
IEA273I TOD CLOCKS DYNAMICALLY ADVANCED TO MAINTAIN ETR SYNCHRONISM.

Mixed CTN to ETR Transition

The final step for completely reversing out of a Mixed CTN and returning to the original ETR timing mode is to remove the STP ID portion of the CTN ID for each STP-configured CPC



Mixed CTN to ETR Transition



The following z/OS message captures illustrate how z/OS® recognized that the CTN ID had changed.

Unsolicited

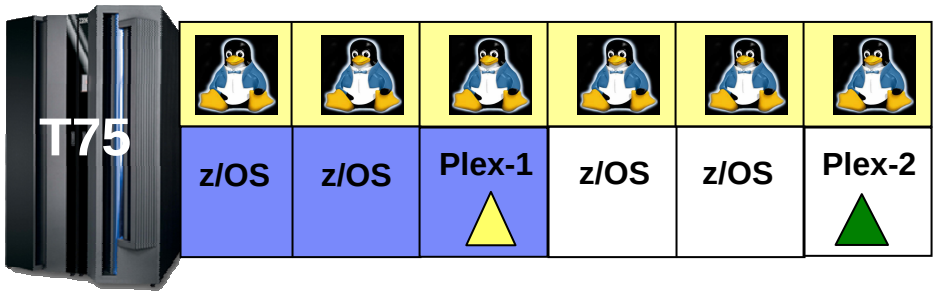
IXC438I COORDINATED TIMING INFORMATION
HAS BEEN UPDATED 717
FOR SYSTEM: JC0
PREVIOUS CTNID: PETCTN -01
CURRENT ETR NETID: 01

Solicited

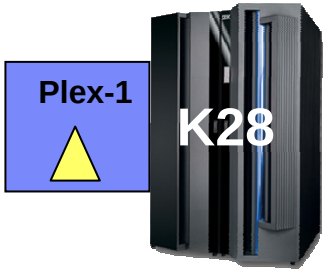
RO JB0,D ETR
IEA282I 12.15.52 TIMING STATUS 448
SYNCHRONIZATION MODE = ETR

CPC PORT 0 <== ACTIVE	CPC PORT 1
OPERATIONAL	OPERATIONAL
ENABLED	ENABLED
ETR NET ID=01	ETR NET ID=01
ETR PORT=04	ETR PORT=04
ETR ID=00	ETR ID=01

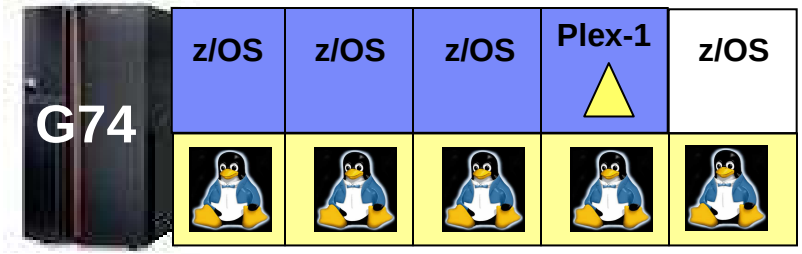
z/OS Integration Test
Revised Data Center Topology



z9-EC: 2094-S38
392GB – 38CP

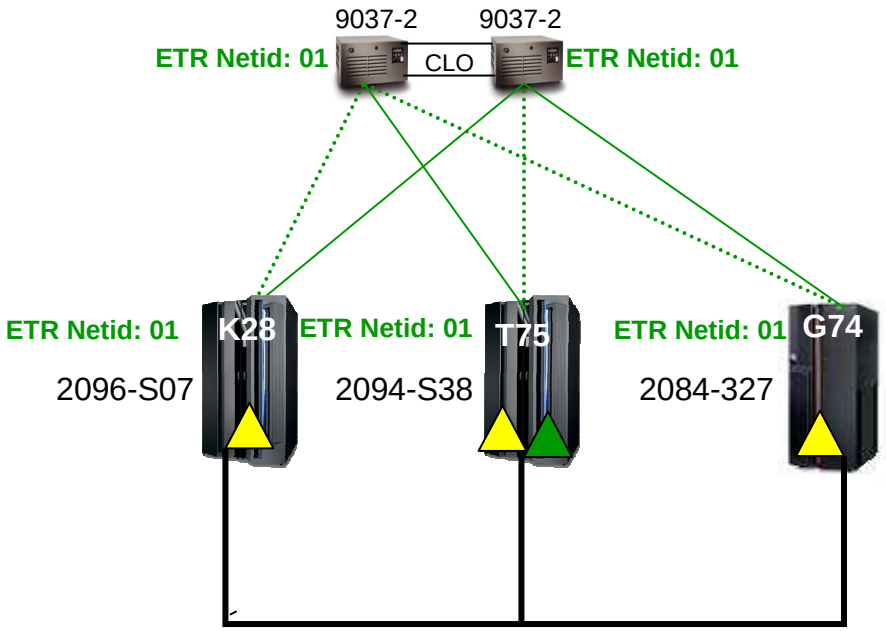


z9-BC : 2096-S07
8GB – 4 CP



z990-D32 : 2084-325 160GB – 32CP

z/OS Integration Test
Revised Sysplex Timer® Topology



ISC/ICB Peer link connectivity

Plex-1 ICF Plex-2 ICF

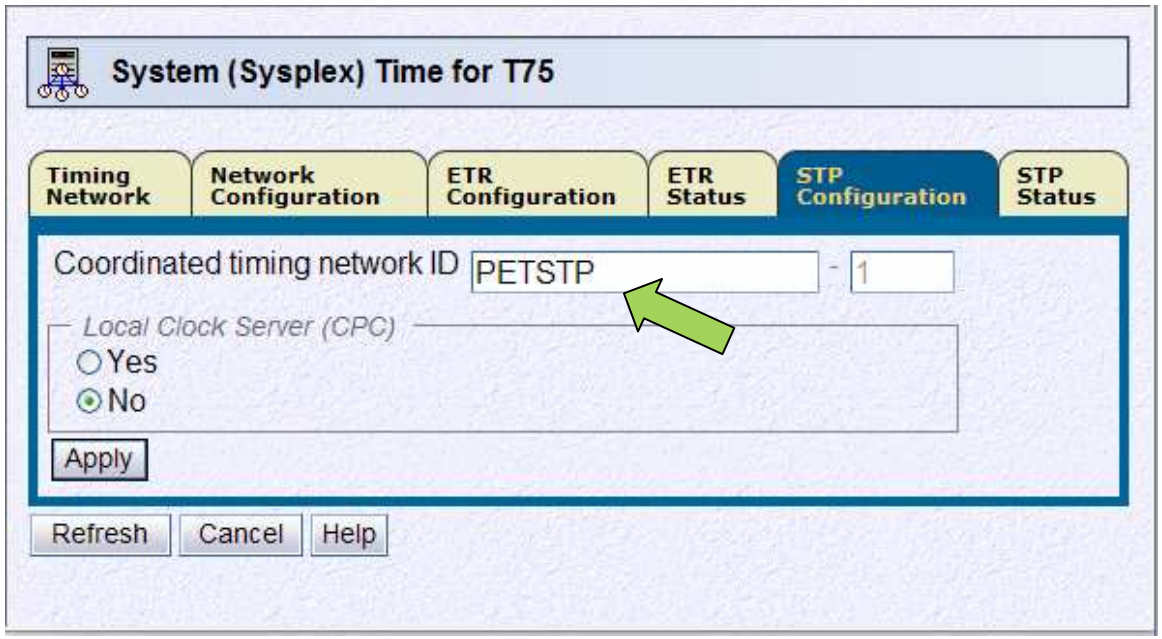
Peer Links
Send/Receive

Active
ETR link

Alternate
ETR link

STP Configuration Panel

Migration to a Mixed CTN: Configure the STPid portion of the CTNid



IXC438I COORDINATED TIMING INFORMATION HAS BEEN UPDATED 121
FOR SYSTEM: JF0
PREVIOUS ETR NETID: 01
CURRENT CTNID: PETSTP -01

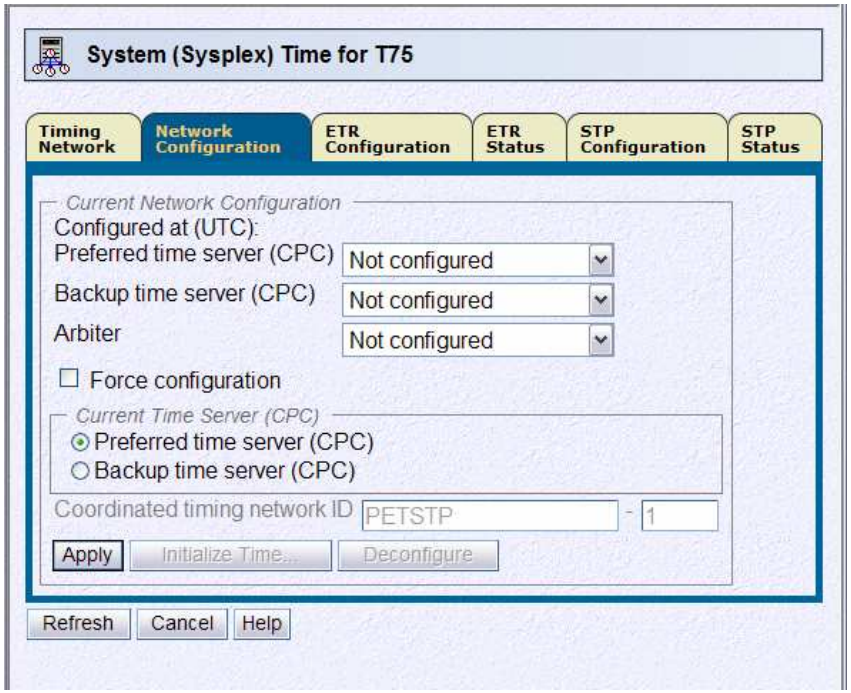
This message is repeated for all of the other images on the T75 CPC

Preferred, Backup and Arbiter Assignments

At a minimum, a Preferred Time Server (PTS) must be selected.

- If additional CPCs are available, (i.e.: configured with matching CTNids), then selecting a Backup Time Server (BTS) is optional.

- If a Backup Time Server is selected, and another STP configured CPC is available, then an Arbiter can be selected.



Selection Criteria

- Location (if multi-site CTN)
- CPC Technology levels
- Maintenance considerations
  - CFCC upgrades is one example
- Available connectivity
  - even though Stand Alone Coupling Facility seems like a good choice, there are no z/OS messages to monitor

Preferred, Backup and Arbiter Assignments

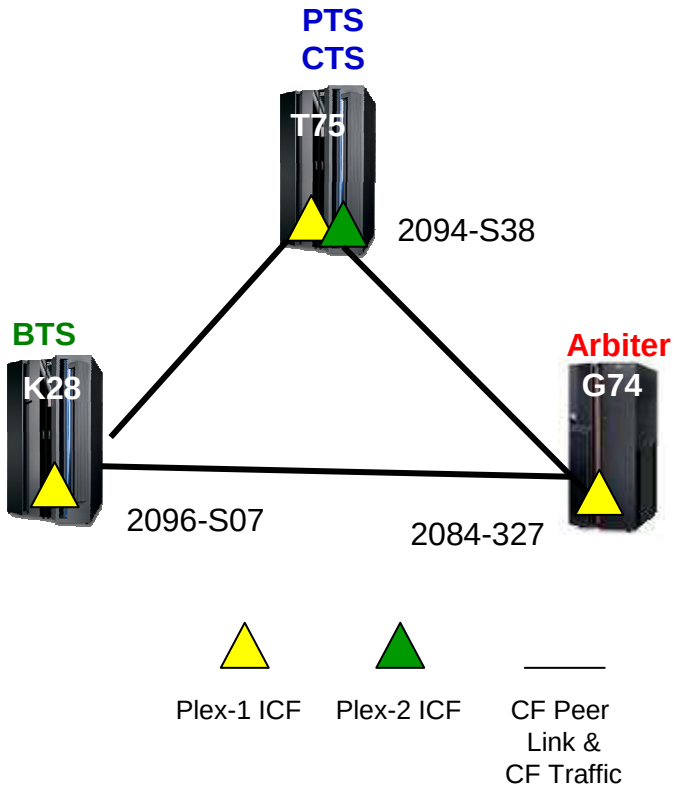
Our Selection Criteria

PTS: Preferred Time Server
- T75 most powerful and most current technology

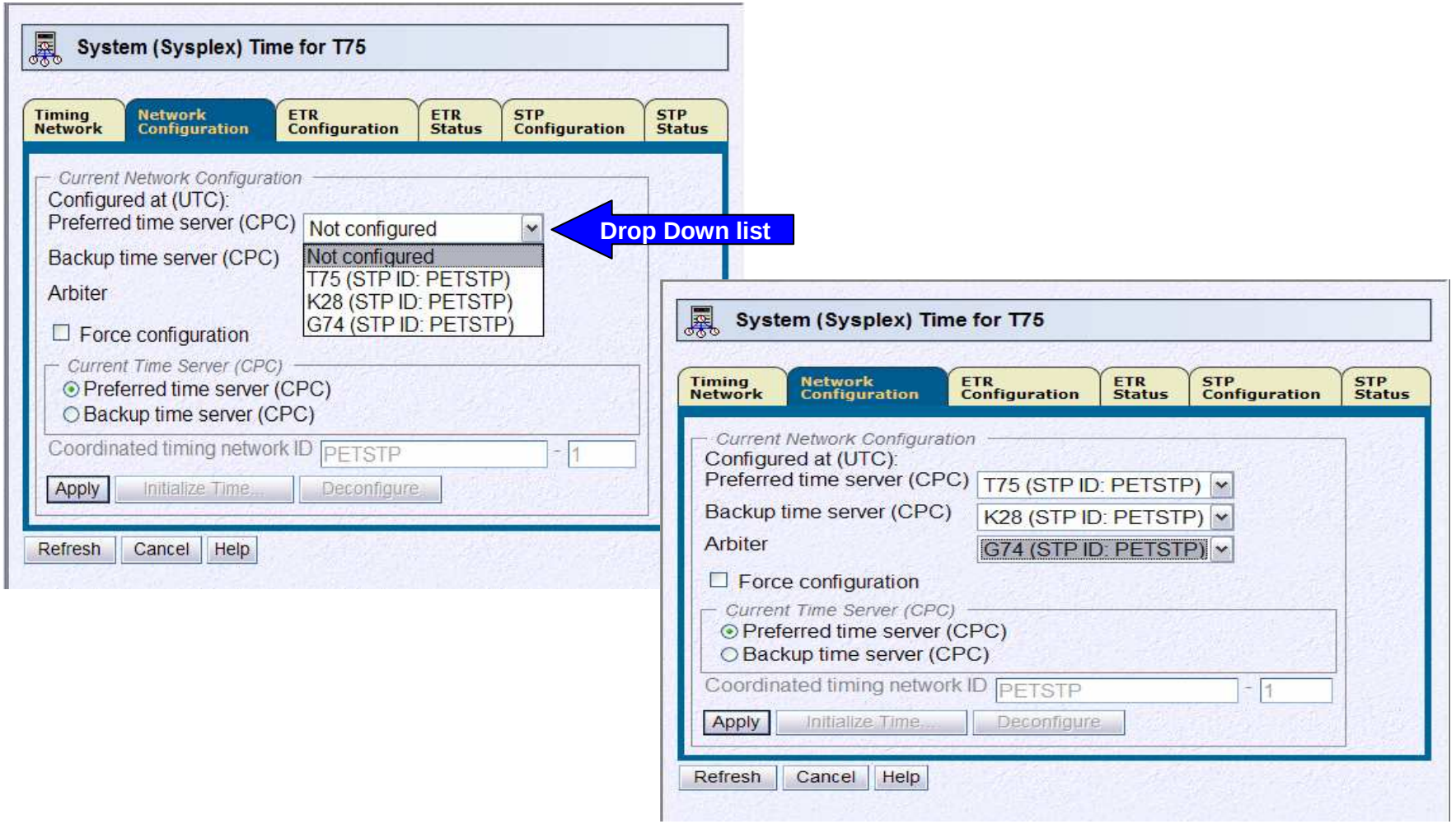
CTS: Current Time Server
- Begin with the PTS being the CTS (default)
  - then move the CTS role over to the BTS later

BTS: Backup Time Server
- Our data center will be moving within the next 6-8 months
- K28 is the next highest, most current technology
  - K28 has redundant connectivity to all other CPCs
  - Downside: K28 is a SACF, so we will not receive any STP related z/OS messages
- Demonstrate CTS movement prior to data center move

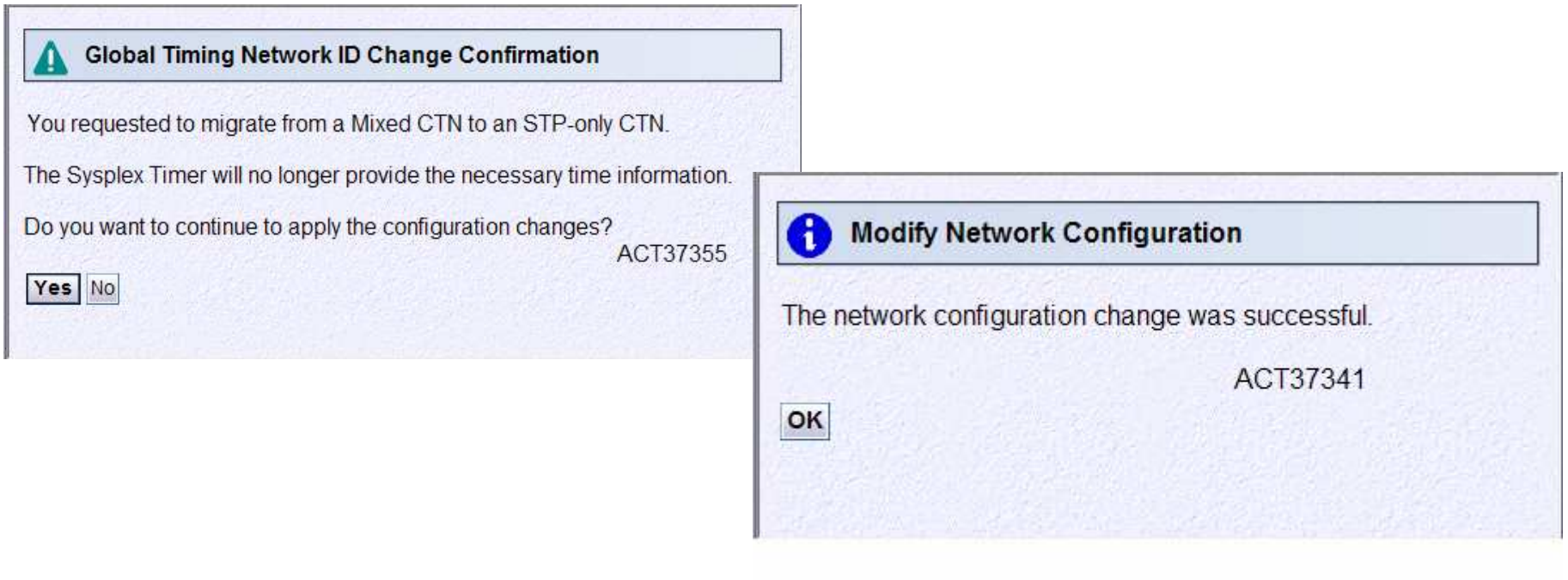
Arbiter:
- G74: this is in support of a triad recommendation.



STP-Only Network Configuration



STP-Only Network Configuration Messages



Unsolicited z/OS messages

***IEA393I ETR PORT 0 IS NOT OPERATIONAL. THIS MAY BE A CTN CONFIGURATION CHANGE.**
***IEA393I ETR PORT 1 IS NOT OPERATIONAL. THIS MAY BE A CTN CONFIGURATION CHANGE.**
IEA380I THIS SYSTEM IS NOW OPERATING IN STP TIMING MODE.

z/OS STP-Only Network Configuration Messages

Unsolicited z/OS messages

IXC438I COORDINATED TIMING INFORMATION HAS BEEN UPDATED 718
FOR SYSTEM: J80
PREVIOUS CTNID: PETSTP -01
CURRENT CTNID: PETSTP

*IXL162E CF REQUEST TIME ORDERING: **REQUIRED AND WILL NOT BE ENABLED** 147
COUPLING FACILITY 002084.IBM.00.0000000**1B52A**
PARTITION: 24 CPCID: 00
REASON: CTNID MISMATCH. CF CTNID: PETSTP

*IXL162E CF REQUEST TIME ORDERING: **REQUIRED AND WILL NOT BE ENABLED** 148
COUPLING FACILITY 002094.IBM.02.0000000**C299E**
PARTITION: 23 CPCID: 00
REASON: CTNID MISMATCH. CF CTNID: PETSTP

*IXL162E CF REQUEST TIME ORDERING: **REQUIRED AND WILL NOT BE ENABLED** 149
COUPLING FACILITY 002096.IBM.02.0000000**5B96F**
PARTITION: 01 CPCID: 00
REASON: CTNID MISMATCH. CF CTNID: PETSTP

STP-Only Network Configuration Messages

Unsolicited z/OS messages indicating that "XCF" recognizes the mismatched CTNid and will attempt to hold the sysplex together long enough…

*IXC439E ALL SYSTEMS IN SYSPLEX UTCPLXJ8 ARE **NOT SYNCHRONIZED** 724
TO THE SAME TIME REFERENCE.
SYSTEM: JF0 IS USING CTNID: PETSTP -01
SYSTEM: J80 IS USING CTNID: PETSTP
SYSTEM: JA0 IS USING CTNID: PETSTP -01
SYSTEM: JB0 IS USING CTNID: PETSTP -01
SYSTEM: J90 IS USING CTNID: PETSTP -01
SYSTEM: JC0 IS USING CTNID: PETSTP -01
SYSTEM: JE0 IS USING CTNID: PETSTP -01

…so that the CTNid change can propagate across all of the systems in the sysplex.

*IXC439E ALL SYSTEMS IN SYSPLEX UTCPLXJ8 ARE **NOT SYNCHRONIZED** 129
TO THE SAME TIME REFERENCE.
SYSTEM: JF0 IS USING CTNID: PETSTP
SYSTEM: J80 IS USING CTNID: PETSTP
SYSTEM: JA0 IS USING CTNID: PETSTP -01
SYSTEM: JB0 IS USING CTNID: PETSTP
SYSTEM: J90 IS USING CTNID: PETSTP
SYSTEM: JC0 IS USING CTNID: PETSTP
SYSTEM: JE0 IS USING CTNID: PETSTP

STP-Only Network Configuration Messages

Synchronized Timing was successfully propagated across all z/OS images and CFs

IXC435I ALL SYSTEMS IN SYSPLEX UTCPLXJ8 ARE **NOW SYNCHRONIZED** 531
TO THE SAME TIME REFERENCE.
SYSTEM: JF0 IS USING CTNID: PETSTP
SYSTEM: J80 IS USING CTNID: PETSTP
SYSTEM: JA0 IS USING CTNID: PETSTP
SYSTEM: JB0 IS USING CTNID: PETSTP
SYSTEM: J90 IS USING CTNID: PETSTP
SYSTEM: JC0 IS USING CTNID: PETSTP
SYSTEM: JE0 IS USING CTNID: PETSTP

IXL161I CF REQUEST TIME ORDERING: **REQUIRED AND ENABLED** 155
COUPLING FACILITY 002084.IBM.00.0000000**1B52A**
PARTITION: 24 CPCID: 00
IXL161I CF REQUEST TIME ORDERING: **REQUIRED AND ENABLED** 156
COUPLING FACILITY 002094.IBM.02.0000000**C299E**
PARTITION: 23 CPCID: 00
IXL161I CF REQUEST TIME ORDERING: **REQUIRED AND ENABLED** 157
COUPLING FACILITY 002096.IBM.02.0000000**5B96F**
PARTITION: 01 CPCID: 00

STP-Only z/OS Display Messages

D ETR on a z/OS image running on the Current time server/Preferred time server

IEA386I 11.48.49 TIMING STATUS
SYNCHRONIZATION MODE = STP
THIS SERVER IS A STRATUM 1
CTN ID = PETSTP
THE STRATUM 1 NODE ID = 002094.S54.IBM.02.0000000C299E
THIS IS THE PREFERRED TIME SERVER

D ETR command to a z/OS image running on the Arbiter server

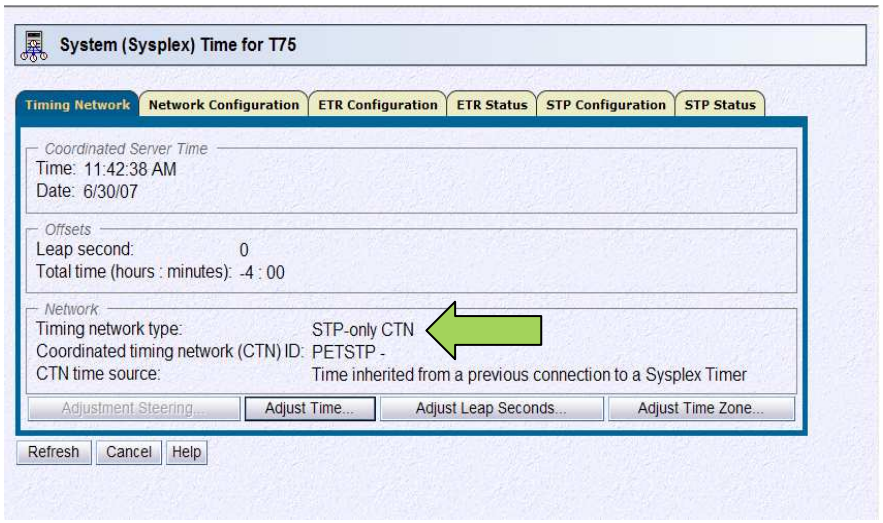
IEA386I 11.51.38 TIMING STATUSSYNCHRONIZATION MODE = STP
THIS SERVER IS A STRATUM 2
CTN ID = PETSTP
THE STRATUM 1 NODE ID = 002094.S54.IBM.02.0000000C299E
THIS IS THE ARBITER SERVER
NUMBER OF USABLE TIMING LINKS = 8

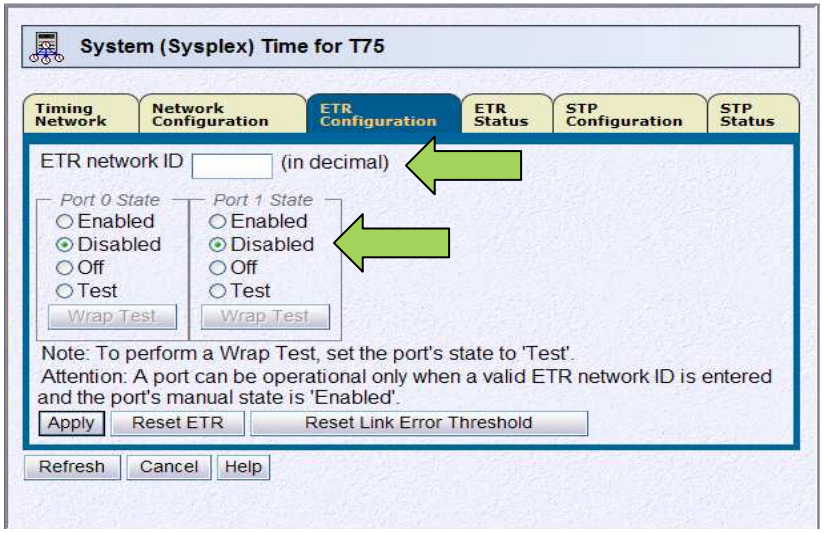
D XCF,S,ALL command now shows:

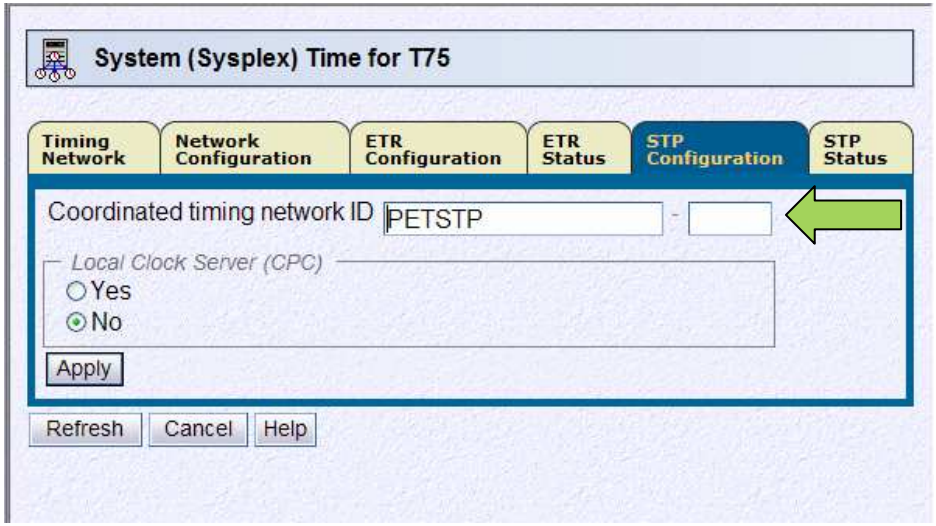
IXC335I 11.48.43 DISPLAY XCF

SYSTEM	TYPE	SERIAL	LPAR	STATUS	TIME	SYSTEM STATUS	
J80	2094	299E	07		06/30/2007 11:48:43	ACTIVE	**TM=STP**
JC0	2084	B52A	0C		06/30/2007 11:48:38	ACTIVE	**TM=STP**
JA0	2084	B52A	2A		06/30/2007 11:48:40	ACTIVE	**TM=STP**
JB0	2084	B52A	01		06/30/2007 11:48:38	ACTIVE	**TM=STP**
J90	2094	299E	05		06/30/2007 11:48:38	ACTIVE	**TM=STP**
JF0	2094	299E	06		06/30/2007 11:48:40	ACTIVE	**TM=STP**
JE0	2084	B52A	22		06/30/2007 11:48:40	ACTIVE	**TM=STP**

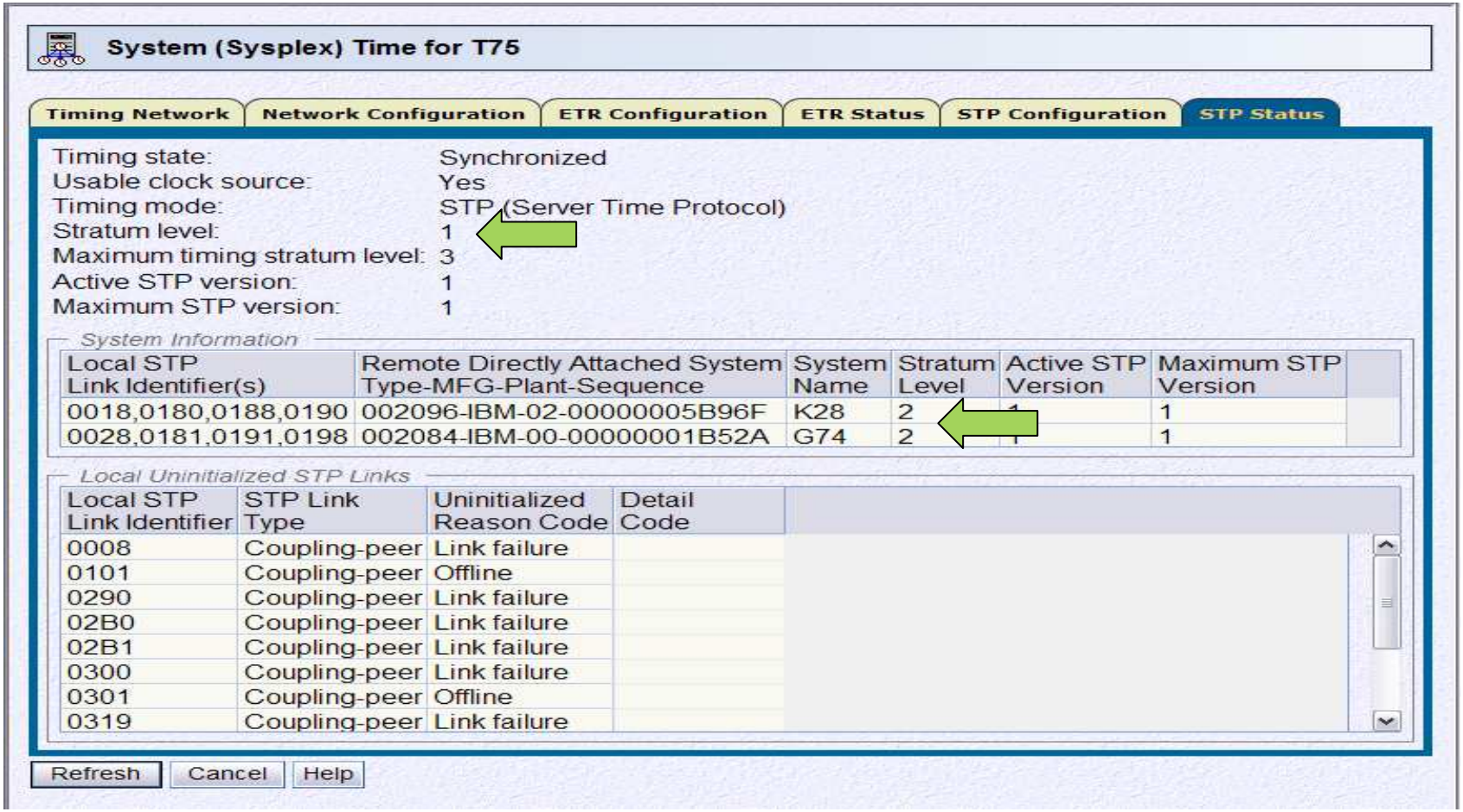
STP-Only Panel Verifications



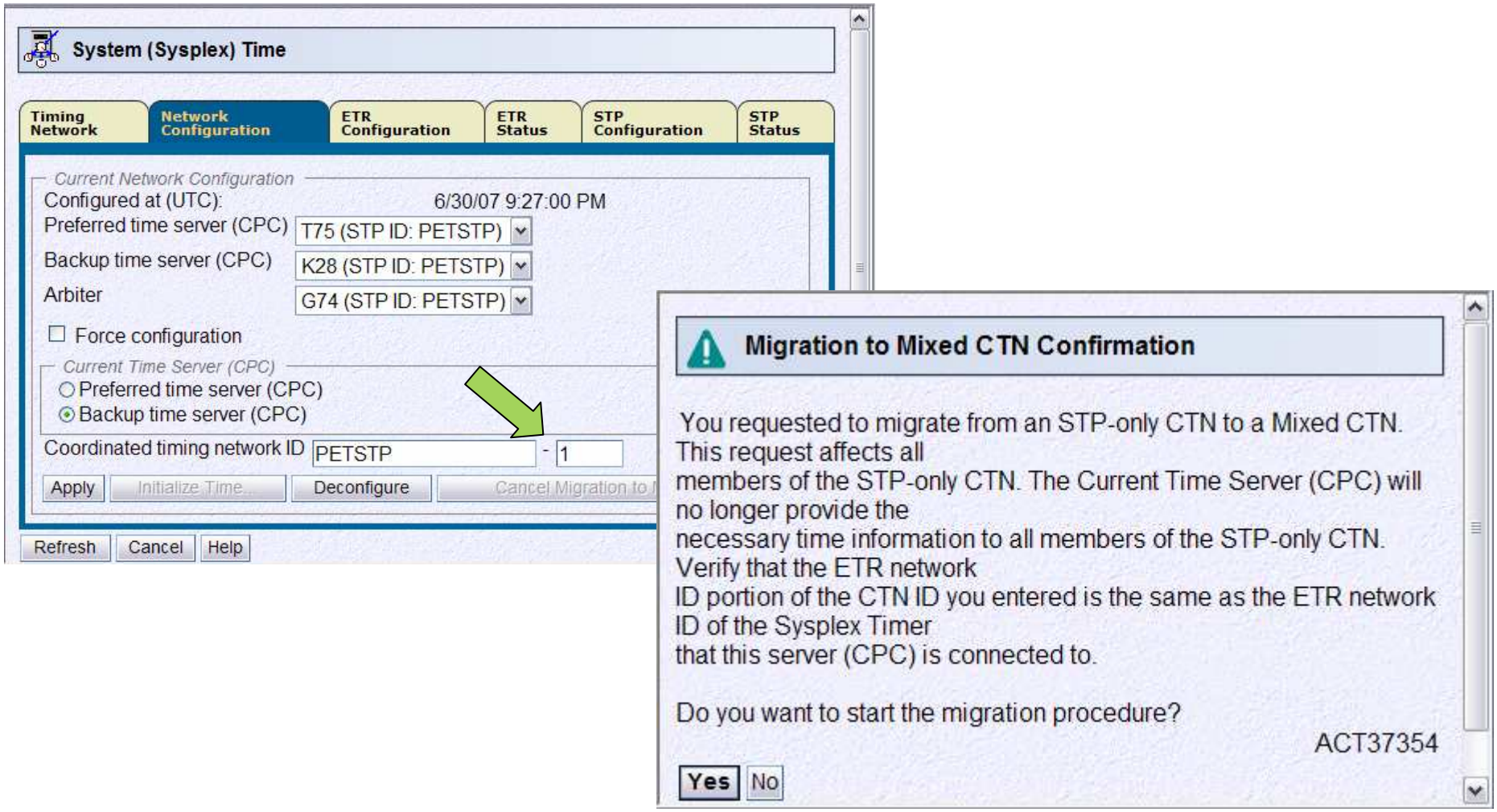




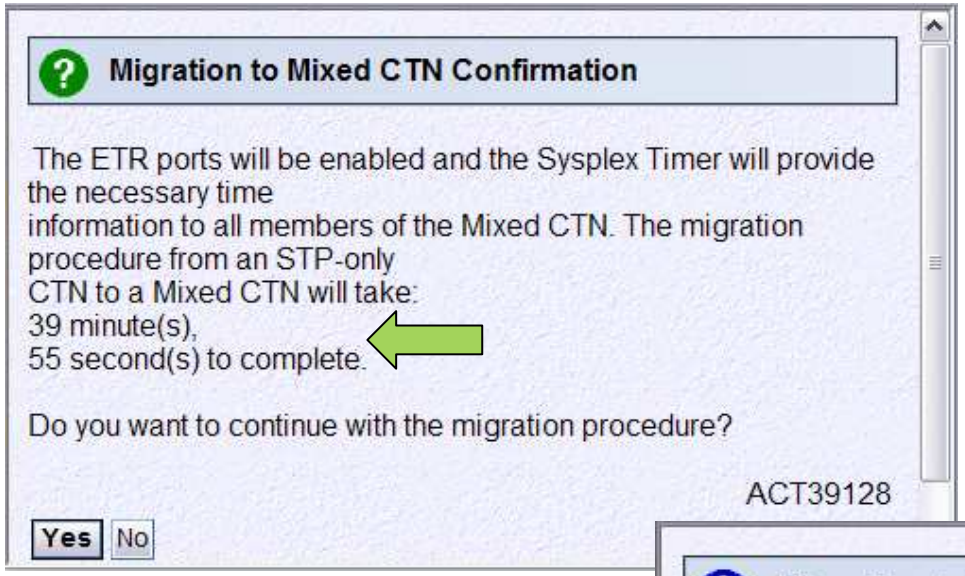
STP-Only Panel Verification – STP Status

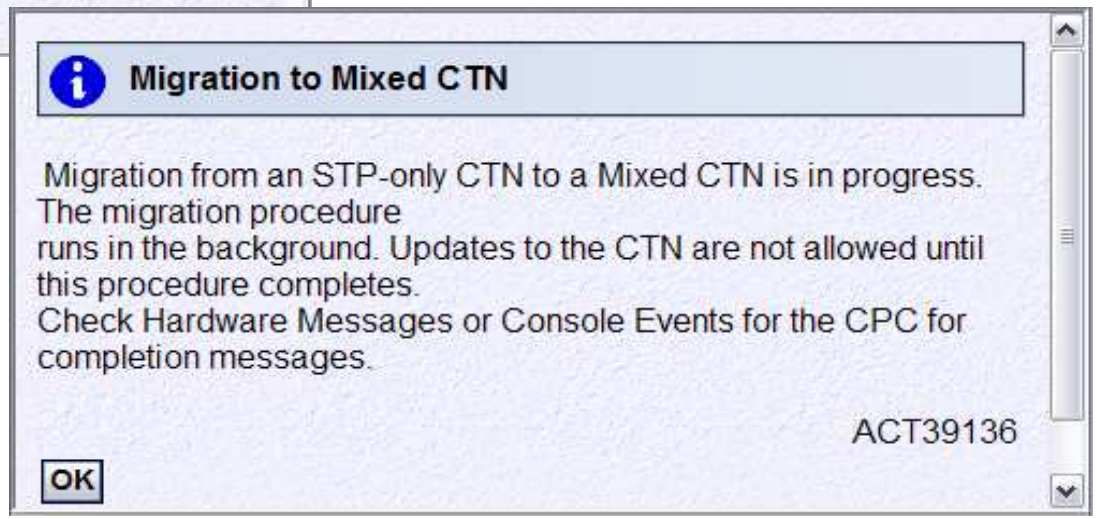


STP-Only Reverse Transition
Back to a Mixed CTN



STP-Only Reverse Transition to Mixed CTN Confirmation without ETS

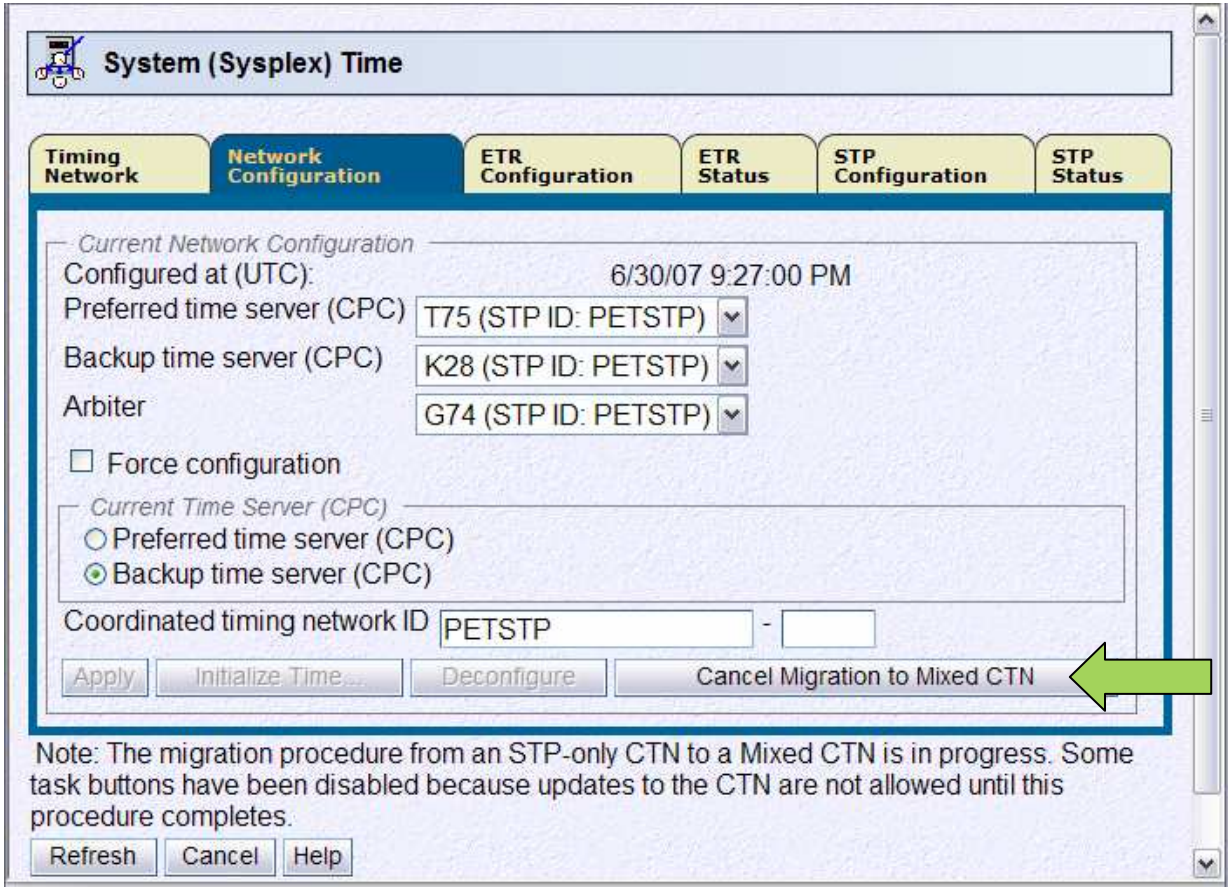




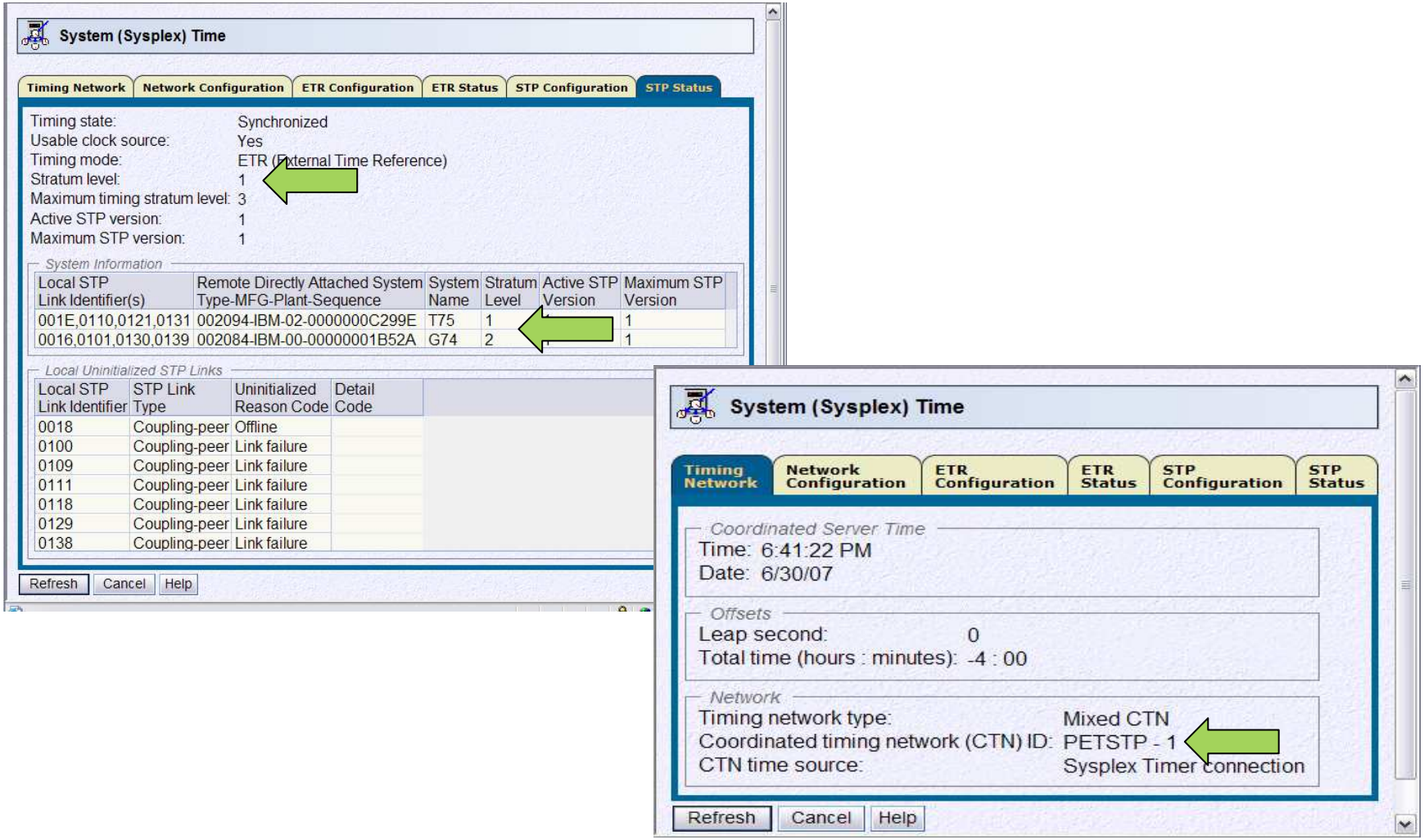
Wish we had an ETS connection…

…would not have to wait nearly 40 minutes to synchronize back to the Sysplex Timers.

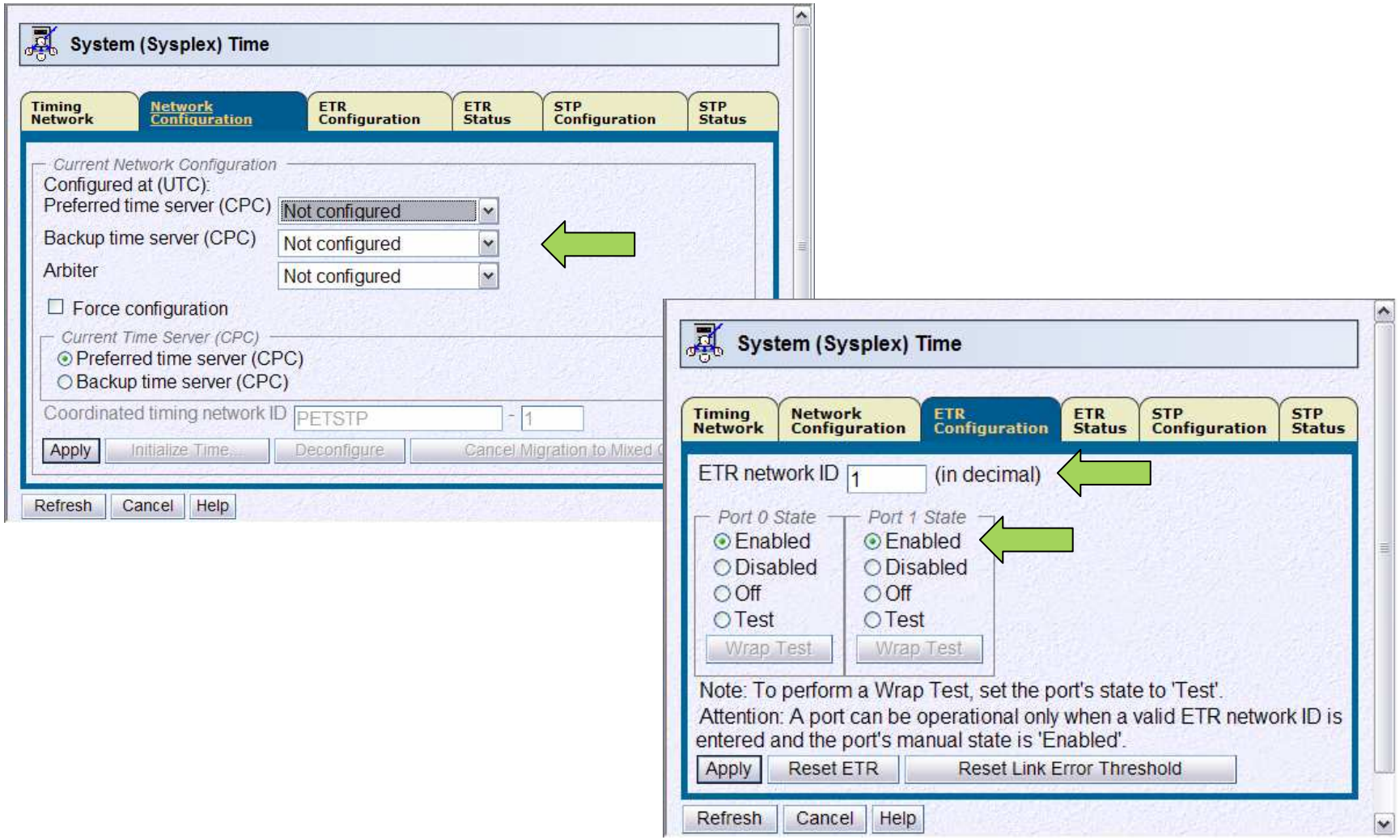
STP-Only Reverse Transition to Mixed CTN In Progress



STP-Only Reverse Transition to Mixed CTN Panel Verifications



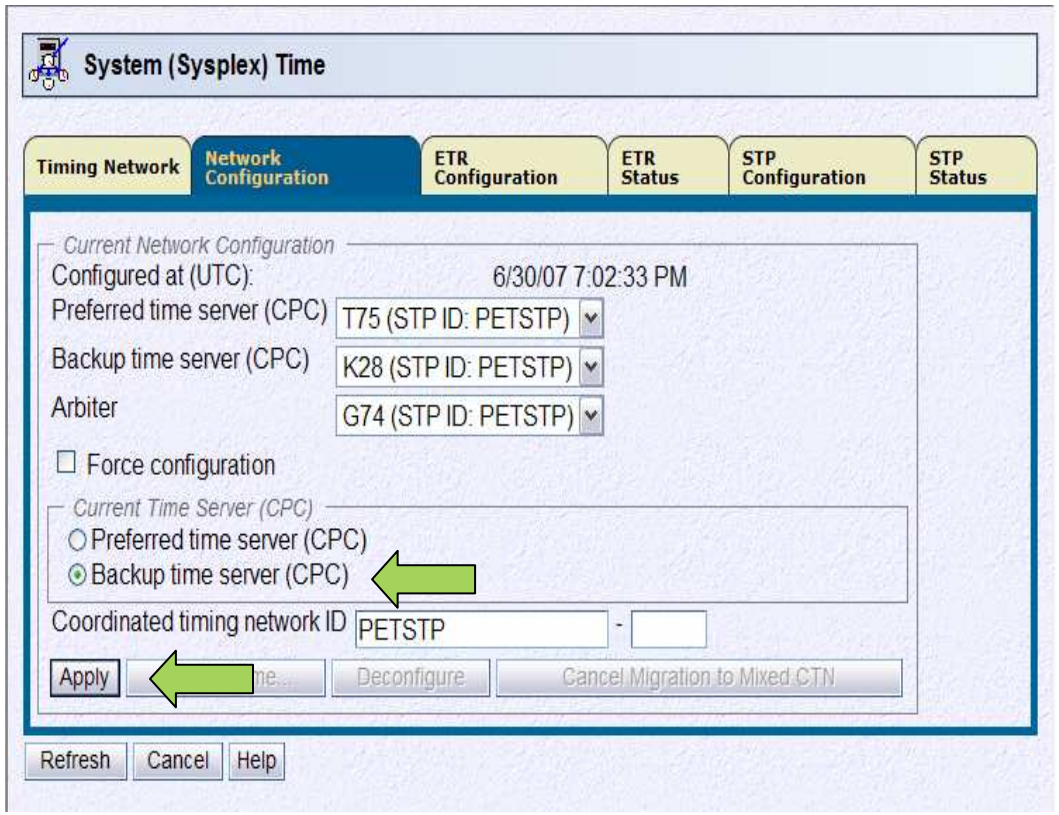
STP-Only Reverse Transition to Mixed CTN Panel Verifications

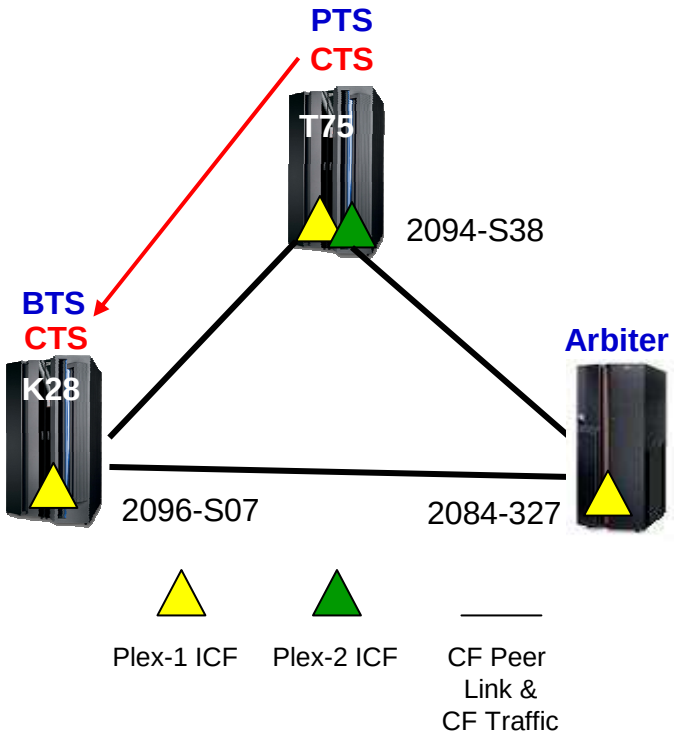


Questions?

Backup

CTS Reassignment





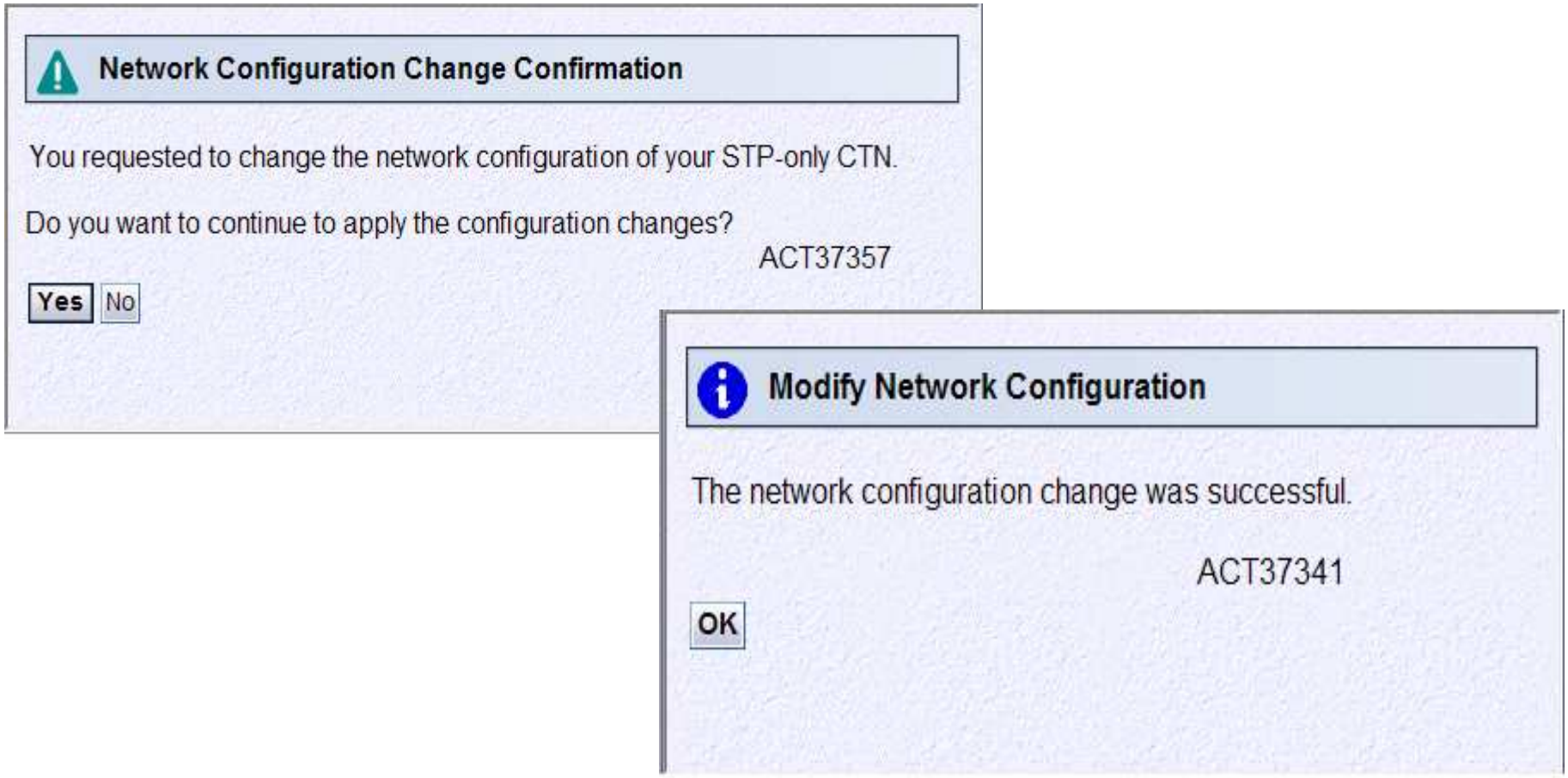
From the BTS (K28) System (Sysplex) Time Task…

…the CTS assignment is “pulled” from the PTS (T75)

…not “pushed” to the BTS

in other words, this configuration change is initiated from the BTS, not from the PTS

STP-Only CTS Reassignment Confirmations



STP-Only CTS Reassignment Confirmations

No messages originate from the SACF (K28) which is now the CTS.

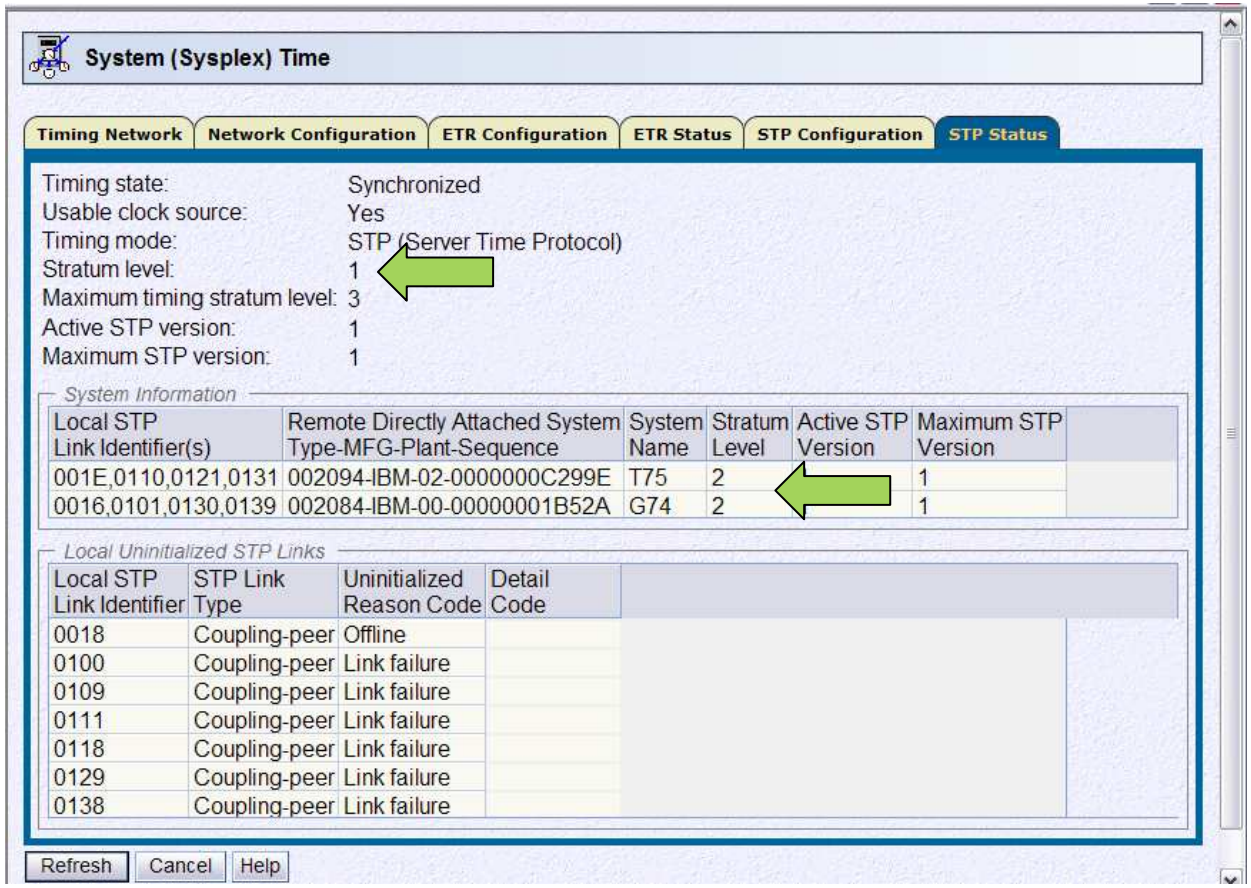
Therefore, issuing a D ETR to a z/OS image on each CEC will show…

- …the Preferred Time Server is no longer the CTS, or it would be the Stratum 1 node
- …that both of these CECs are now at Stratum 2
- …the Stratum 1 node descriptor matches that of the K28 SACF
- …the **Arbiter** has not changed roles, or Stratum level

IEA386I 18.20.13 TIMING STATUS FRAME LAST F E SYS=**J80**
SYNCHRONIZATION MODE = STP
THIS SERVER IS A STRATUM 2
CTN ID = PETSTP
THE STRATUM 1 NODE ID = 002096.S07.IBM.02.0000000**5B96F**
THIS IS THE PREFERRED TIME SERVER
NUMBER OF USABLE TIMING LINKS = 8

IEA386I 18.21.38 TIMING STATUS FRAME LAST F E SYS=**JA0**
SYNCHRONIZATION MODE = STP
THIS SERVER IS A STRATUM 2
CTN ID = PETSTP
THE STRATUM 1 NODE ID = 002096.S07.IBM.02.0000000**5B96F**
THIS IS THE **ARBITER SERVER**
NUMBER OF USABLE TIMING LINKS = 8

STP-Only CTS Reassignment Panel Confirmations



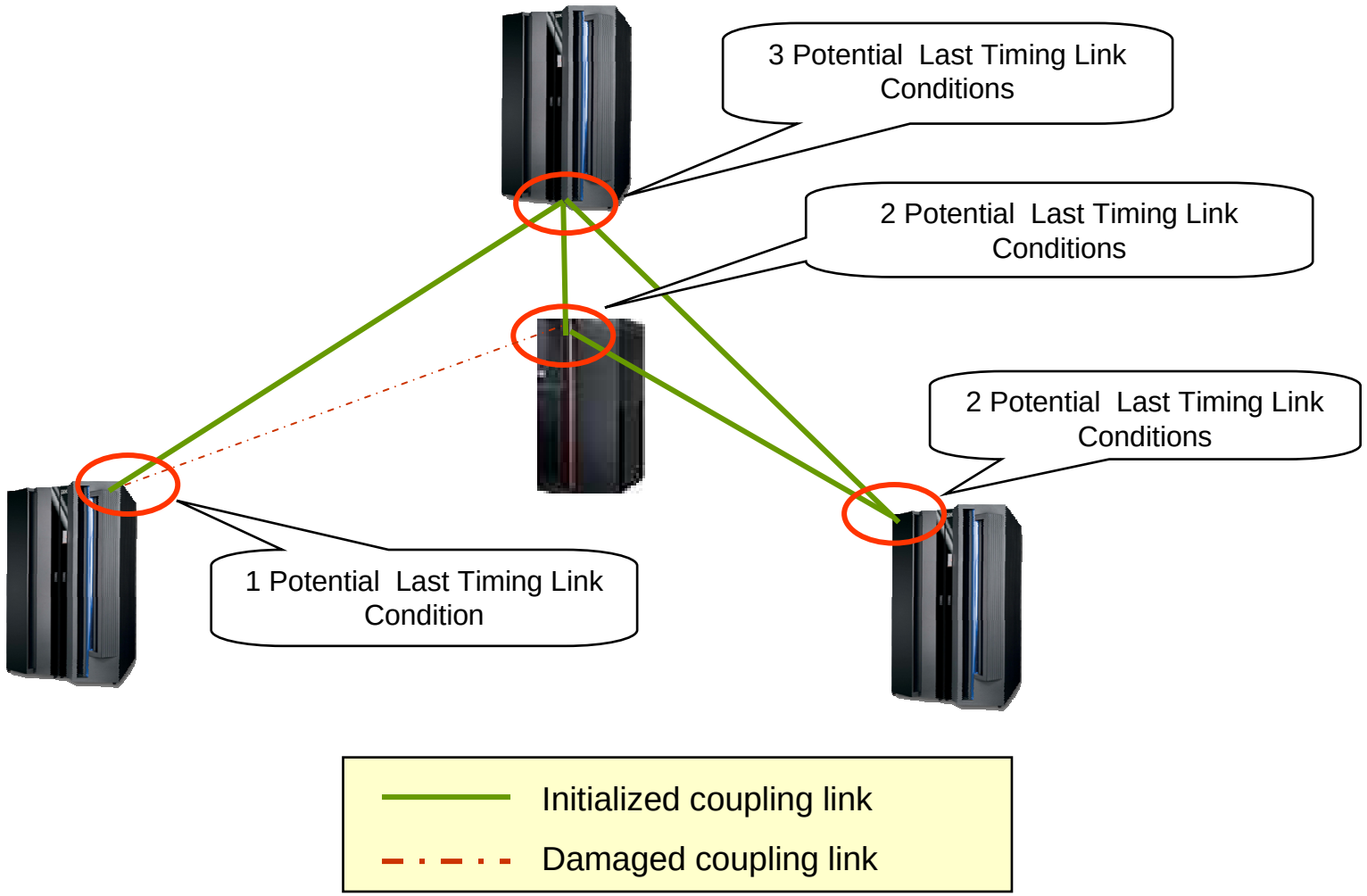
Server Time Protocol “Last Path Validation”

the “last timing link…"

- …is the last coupling link that is being used to deliver STP timing between two IBM System z servers (z9 EC, z9 BC, zSeries® 890 and 990)
  - A single server can potentially have multiple “last timing links”
    - Therefore, the “last timing link” is not necessarily the server’s last online coupling link
- A "last timing link" condition occurs when the following two conditions are true:
  1. The Physical Channel Identifier (PCHID) is initialized for STP timing and is the only remaining PCHID between two IBM System z servers (z9 EC, z9 BC, zSeries® 890 and 990)…
     - …in either a Mixed or STP-only Coordinated Timing Network (CTN)
  2. The Channel Path Identifier (CHPID) status is online to only one logical partition…
     - …the CHPID has only one partition remaining in its access list.
- Loss of the “last timing link” may cause a loss of timing synchronization for all system images on the server that is being synchronized (Stratum 2 or Stratum 3).

  …in either a Mixed, or in an STP-only CTN

A thousand words…



Server Time Protocol "Last Path Validation"

z/OS Safeguards are provided to prevent accidentally removing a "last timing link"

New messages in z/OS® V1R7 and higher indicate when a "last timing link" condition exists

IEA382I THIS SERVER HAS ONLY A SINGLE LINK AVAILABLE FOR TIMING PURPOSES

- ***Unsolicited Informational message that is issued when z/OS® V1R7 (and higher) recognizes that the server it resides on has gone*** *from having more than one* ***"STP initialized coupling link" connected to another server*** *down to having only one* ***"STP initialized coupling link" connected to that same server.***
  - "STP Initialized coupling link" is when STP messages are successfully being exchanged between two IBM System z servers (z9 EC, z9 BC, zSeries® 890 and 990) over the respective externally defined coupling link.

IEE148I CHP(xx) NOT RECONFIGURED - WOULD REMOVE A CPC-CRITICAL STP TIMING LINK

- ***In response to explicit CHPID reconfiguration attempts on z/OS® V1R7 or higher servers***
  - **CF CHP(xx),OFF**
  - **CF CHP(xx),OFF,FORCE**

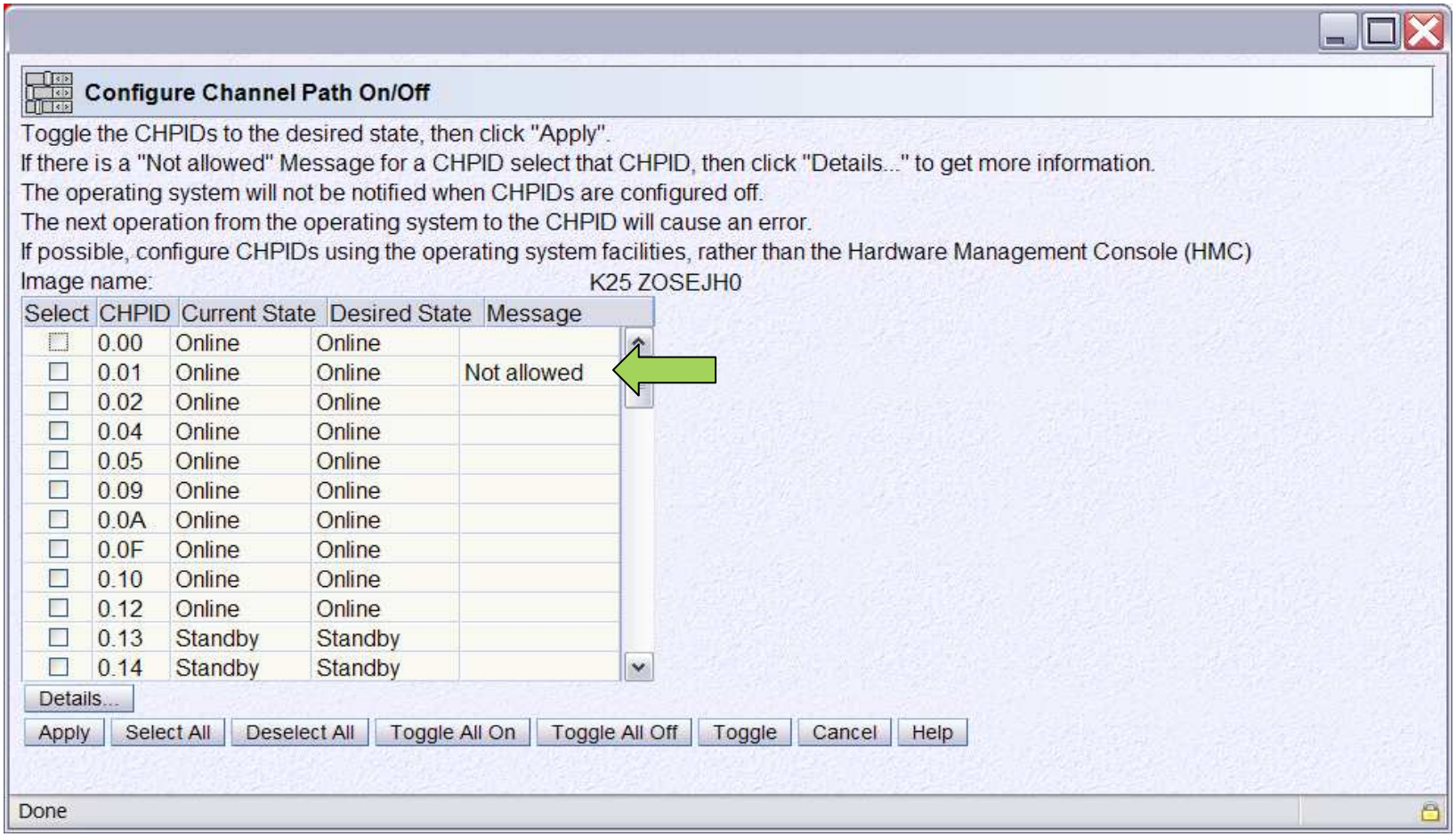
Must now use either the Hardware Management Console (HMC), or the Support Element (SE) to reconfigure the Channel Path off for this "last timing link"

IEE148I CHP(xx) NOT RECONFIGURED - SERVICE PROCESSOR FAILURE

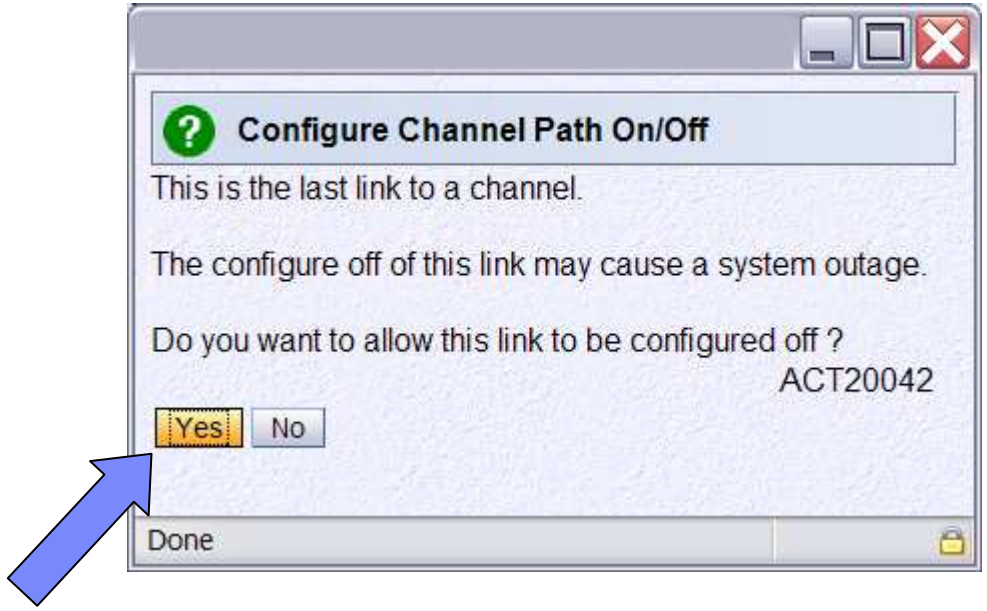
- ***While this is not a new message, it will also be issued on z/OS® V1R6 (and earlier) systems when an attempt is made to remove a "last timing link" .***
  - ***z/OS® V1R6 (or earlier) levels neither support, nor recognize the STP feature.***
    - However, z/OS® V1R6 (or earlier) can still reside on servers that are configured in a STP Mixed CTN as long as the server(s) they reside on remain connected to at least one IBM 9037 Sysplex Timer®.

STP Last Path Validation
HMC Chpid Reconfiguration

Must use the HMC (or SE) to reconfigure the last Channel Path off



STP Last Path Validation
HMC Chpid Reconfiguration



STP Last Path Validation
HMC Chpid Reconfiguration

Can now select and then “Toggle” the Channel Path off