

IBM Education Assistance for z/OS V2R2

Item: STP CTN State Messages

Element/Component: Timer supervisor



Agenda

- Trademarks
- Presentation Objectives
- Overview
- Review STP Server Rules
- STP Recovery Rules
- CTN State Change Messages
- Interactions & Dependencies
- Presentation Summary
- Appendix



Trademarks

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



Presentation Objectives

- **Briefly review :**
 - STP server roles.
 - Recovery rules.

- **Learn about events which impact to arbiter assisted recovery processing.**

- **Introduce new support to issue messages which highlight:**
 - The status of arbiter assisted recovery processing in the CTN.
 - The attachment state of STP role servers.



Overview

▪ Problem Statement / Need Addressed

- STP recovery processing is critical to preventing sysplex-wide (or potentially multi-sysplex) outages.
- Arbiter assisted recovery is a key mechanism used to keep STP functional following failure events.
- CTN state changes can lead to the disablement of arbiter assisted recovery. The installation is not notified of these changes by z/OS.

▪ Solution

- z/OS will issue new messages to alert the installation when a CTN state change occurs which can impact arbiter assisted recovery.

▪ Benefit / Value

- Better operational awareness to the status of arbiter assisted recovery.



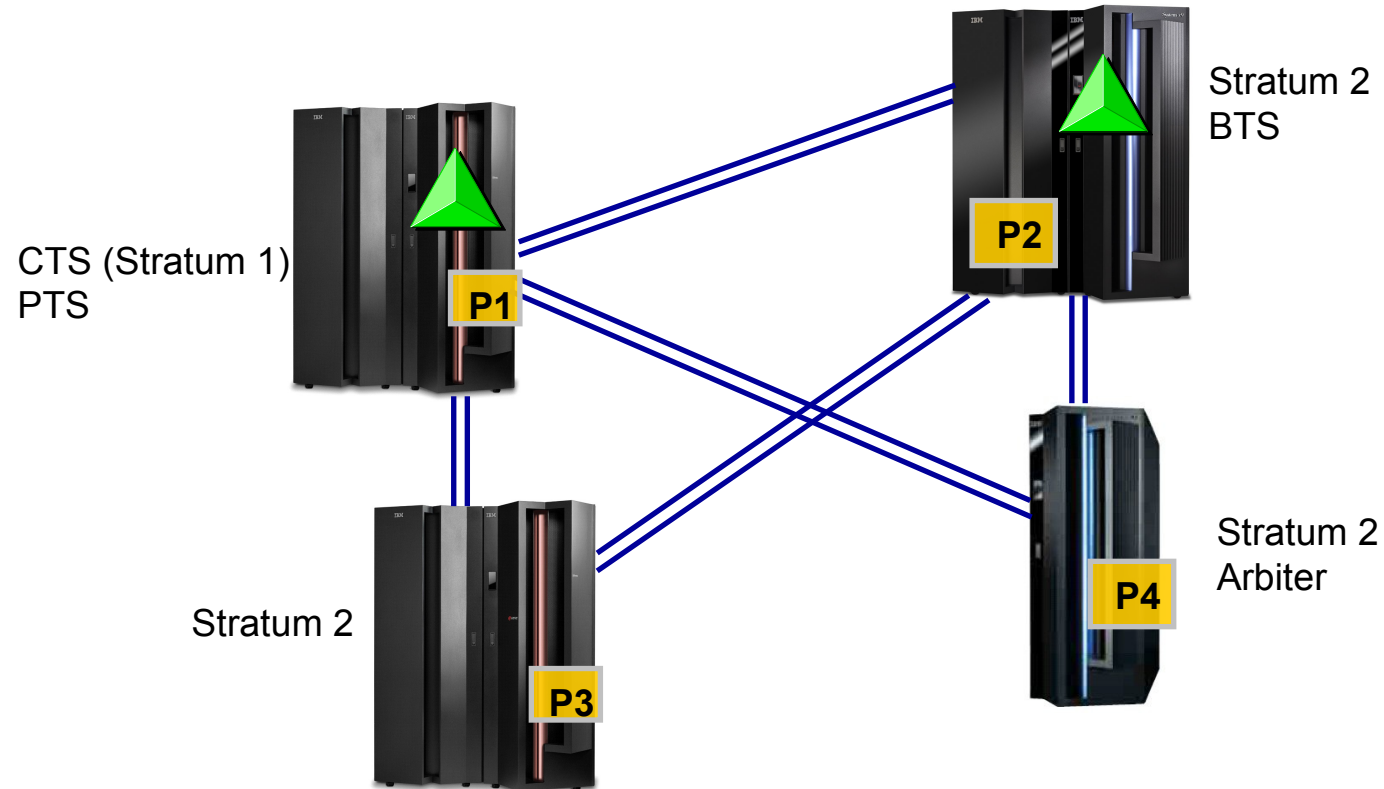
Review STP Server Roles

- **Preferred Time Server (PTS)**
 - Server that is preferred to be the Stratum 1 server
 - **Backup Time Server (BTS)**
 - Role is to take over as the Stratum 1 under planned or unplanned outages, without disrupting synchronization
 - **Arbiter**
 - Provides additional means to determine if BTS should take over as the CTS under unplanned outages
-
- **Current Time Server (CTS)**
 - Stratum 1 Server which provides time messages to rest of the timing network
 - Only the PTS or BTS can be assigned as the CTS
 - Normally the PTS is assigned the role of CTS



Review STP Server Roles (continued)

STP-only CTN



STP Recovery Rules

- Rules determine when BTS should take over the stratum 1 role (i.e. CTS).
 - Critical, as the loss of stratum 1 can have severe consequences.
- For a recap of rules for all environments, see the STP Recovery Guide.
- When Preferred, Backup and Arbiter are all defined:
 - Arbiter provides means for BTS to determine when to takeover.
 - **“Arbiter-assisted recovery”**
 - When BTS, Arbiter cannot communicate with CTS
 - BTS takes over.
 - When BTS loses connectivity with the CTS (stratum 1).
 - If Arbiter can communicate with CTS...
 - BTS does not take over. BTS becomes stratum 3.
 - When BTS loses connectivity with the CTS (stratum 1).
 - If BTS can not communicate with Arbiter...
 - Console assisted recovery invoked (uses HMC/SE LAN).



STP Recovery Rules (continued)

- Arbiter-assisted recovery will enter a degraded state when any two STP role servers agree they cannot communicate with the third role server.
 - PTS and BTS can communicate, but neither can communicate with the arbiter.
 - Action: Arbiter-assisted recovery disabled.
 - PTS and arbiter can communicate, but neither can communicate with the BTS.
 - Action: Arbiter-assisted recovery disabled.
 - BTS and arbiter can communicate, but neither can communicate with the PTS.
 - Actions:
 - **BTS takes over CTS (stratum 1) role from PTS.**
 - Arbiter-assisted recovery disabled after recovery.



CTN State Change Messages

- Arbiter-assisted recovery enhanced in 2011 with this support.
- HMC/SE support added to:
 - Display reason that arbiter-assisted recovery is disabled.
 - Hardware message log.
 - See *Appendix B* for example.



CTN State Change Messages

- With this new enhancement, z/OS will issue messages for the following CTN events:
 - Role server attachment state change.
 - “Partial” connectivity.
 - “Degraded” connectivity.
 - Arbiter-assisted recovery is disabled.
 - Arbiter-assisted recovery is enabled.
- This will be the same information shown on the hardware console log.



CTN State Change Messages

- Role server attachment state change:

**IEA398I STP ROLE SERVER ATTACHMENT STATE CHANGE. STATE =
cccccccc REASON=H**

- Where ccccccc is one of:
 - Full
 - Full connectivity between the role servers.
 - Partial
 - A loss of connectivity exists, but not sufficient to fall to a degraded state.
 - Degraded
 - A loss of connectivity exists sufficient to cause the disablement of arbiter-assisted recovery.
- h is the code which identifies the servers affected by the loss of connectivity.



CTN State Change Messages

- Arbiter-assisted recovery is disabled:

IEA396E ARBITER ASSISTED RECOVERY IS DISABLED FOR THE CTN. REASON = hh

- Where hh is a code corresponding to the reason arbiter assisted recovery is disabled.
- Could be due to degraded attachment state:
 - Examples:
 - 11 = Arbiter not attached to primary or backup
 - 12 = Backup not attached to primary or arbiter
 - 13 = Primary not attached to backup or arbiter
- There are other reasons:
 - Role server entered imminent server disruption state.
 - Codes 21 through 23.
 - Role server operating on internal battery feature.
 - Codes 31 through 33.



CTN State Change Messages

- Arbiter-assisted recovery is enabled:

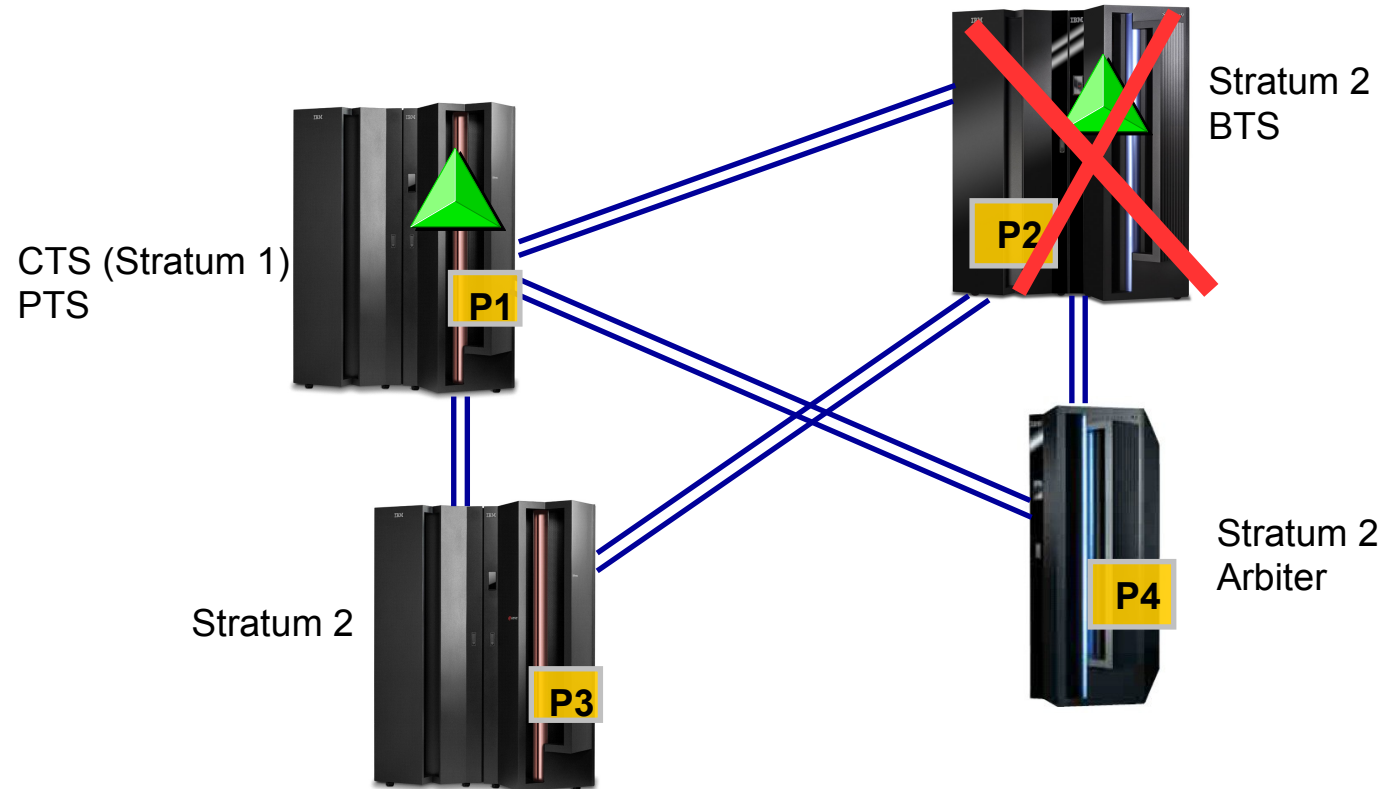
IEA397I ARBITER ASSISTED RECOVERY IS ENABLED FOR THE CTN.

- Indicates return from “degraded” to “full” attachment state.
 - Once degraded reached, arbiter assisted recovery remains disabled until return to full attachment state.
- The outstanding IEA396E is DOM'd.



Message Flow Example – configuration

STP-only CTN



Message Flow Example – Messages Issued

**IEA398I STP ROLE SERVER ATTACHMENT STATE CHANGE. STATE =
DEGRADED REASON=2**

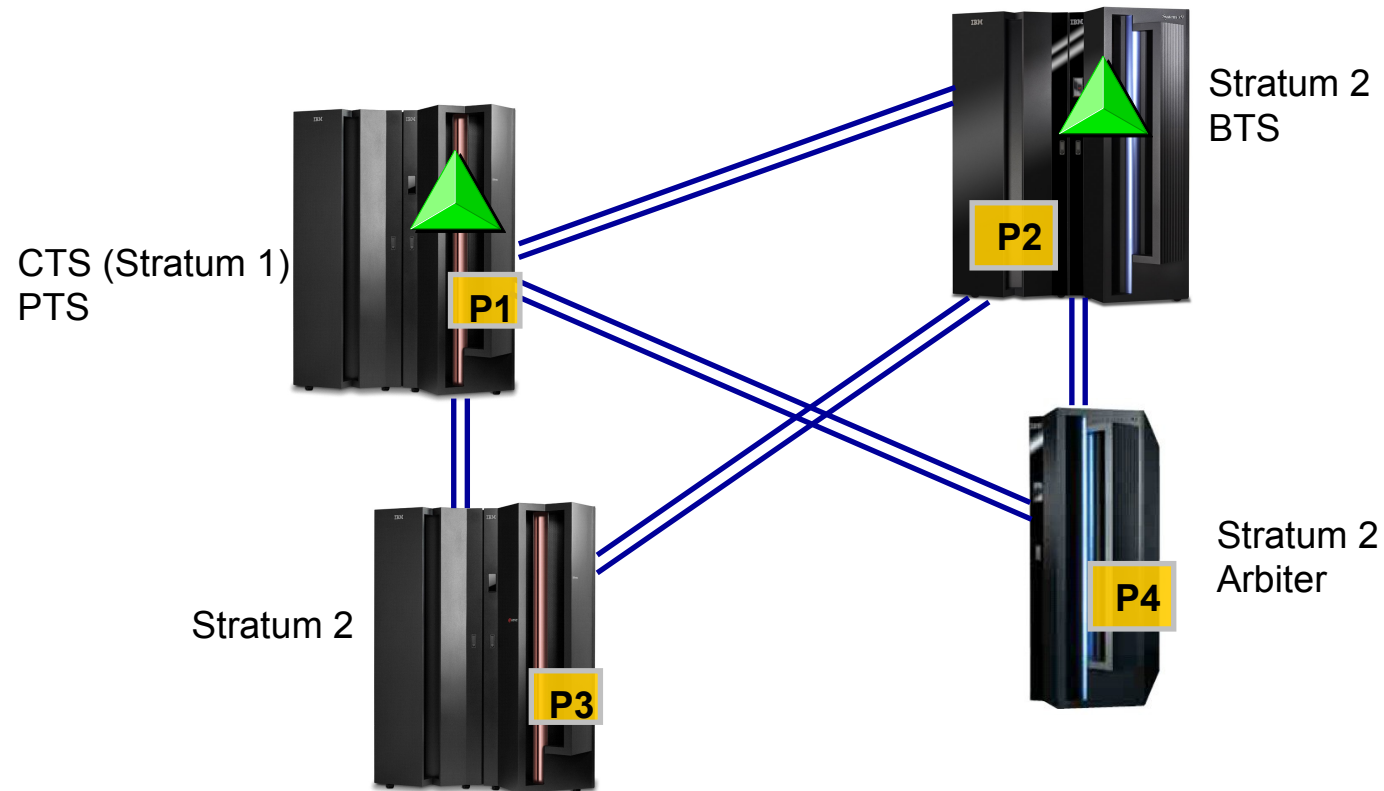
~12 second delay due to STP freewheel period

**IEA396E ARBITER ASSISTED RECOVERY IS DISABLED FOR THE CTN.
REASON = 12**



Message Flow Example – configuration **restored**

STP-only CTN



Message Flow Example – Messages Issued

**IEA398I STP ROLE SERVER ATTACHMENT STATE CHANGE. STATE = FULL
REASON=8**

~12 second delay due to STP freewheel period

DOM:

~~**IEA396E ARBITER ASSISTED RECOVERY IS DISABLED FOR THE CTN.
REASON = 12**~~

IEA397I ARBITER ASSISTED RECOVERY IS ENABLED FOR THE CTN.



Interactions & Dependencies

- Software Dependencies
 - None.
- Hardware Dependencies

Driver/Server	MCL	Bundle	Release Date
D79F/z10	N24406.094	50	Sep 28,2011
D86E/z196	N29799.110	44	Aug 24,2011
D93G/z114 & z196 GA2	Integrated	N/A	Sep 9,2011

- Exploiters
 - None.



Presentation Summary

- CTN state messages are intended to alert you of critical losses of redundancy.
- Understand how to respond to these messages:
 - Confirm CTN state on HMC/SE panels.
 - Take action to restore optimal configuration.





Appendix A

- *z/OS MVS System Messages, Volume 6 (SA22-7636)*
- *Server Time Protocol Recovery Guide (SG24-7380)*
- *Server Time Protocol Implementation Guide (SG24-7281)*
- *Server Time Protocol Planning Guide (SG24-7280)*



Appendix B: Example

 **Problem Analysis - SCZP301** 

System name:

SCZP301

Date:

Sep 22, 2012

Time:

1:38:03 PM

Problem Description

The STP backup time server and arbiter have both lost connectivity to the preferred time server. STP recovery is in a degraded state.

Corrective Actions

Please re-establish connectivity or reassign STP server roles.

Impact of Repair

The repair of this problem can most likely be performed concurrent with CPC operations.

Request Service...

No Service

Display Sense Data

Delete

Cancel

Help

