Oracle® Communications
Tekelec HLR Router

T1200 Disaster Recovery Guide

Release 4.0

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Oracle Communications Tekelec HLR Router, T1200 Disaster Recovery Guide, Release 4.0

CAUTION: Use only the Upgrade procedure included in the Upgrade Kit.

Before upgrading any system, please access Oracle's Tekelec Customer Support site and review any Technical Service Bulletins (TSBs) that relate to this upgrade.

Contact Oracle's Tekelec Customer Care Center and inform them of your upgrade plans prior to beginning this or any upgrade procedure.

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TABLE OF CONTENTS

List of Tables

1.0 INTRODUCTION

1.1 Purpose and Scope

This document describes disaster recovery procedures to be used during disaster scenarios of HLR Router 4.0 product on T1200.

The disaster scenarios covered in document are:

1. Connectivity loss of NOAMP servers and DR NOAMP activation.
2. Defective MP server
3. Defective Query Server
4. Defective SOAM server
5. Defective NOAMP server
6. Defective NOAMP server pair
7. Defective SOAM server pair
8. Defective Telco switch
9. Total loss of independent NOAMP frame
10. Total loss of independent SOAM frame
11. Total loss of combined NOAMP+SOAM frame

This document is intended for execution by Customer Service team on fielded HLR Router 4.0 systems. It also could be used at Oracle's Tekelec site by PV, NPX, and/or development teams.

1.2 References

[1] HLR Router 4.0 Initial Installation and Configuration Guide for T1200, UG006470
[2] Platform 6.5 Configuration Procedure Reference, 909-2249-001
[3] T1200 Platform_OAMP System Configuration 821-0034-08.pdf
[4] T1200 Platform_EXHR Signaling System Configuration 821-0034-09.pdf
[5] Eagle XG HLR Router Network Implementation Guide, 910-5858-001
[6] T1200 Quad-Serial Card Installation, 909-1636-001
[7] Eagle STP Commands Manual, 910-5544-001
[8] TPD Initial Product Manufacture User's Guide, 909-2130-001

1.3 Acronyms

Acronym	Meaning
IMI	Internal Management Interface
ISL	Inter-Switch-Link
MP	Message Processor
NE	Network Element
NOAMP	Network Operations, Administration, Maintenance & Provisioning
RMM	Remote Management Module
SOAM	Systems Operations, Administration & Maintenance
TPD	Tekelec Platform Distribution (Linux OS)
VIP	Virtual IP
XMI	External Management Interface

Table 1 - Acronyms

1.4 Assumptions

This procedure assumes the following;

- The user conceptually understands HLR Router topology and network configuration as described in the HLR Router Network Implementation Guide [5].

- The user has at least an intermediate skill set with command prompt activities on an open systems computing environment such as Linux or TPD.

1.5 How to use this Document

When executing this document, understanding the following helps to ensure that the user understands the manual's intent:

- Before beginning a procedure, completely read the instructional text (it appears immediately after the Section heading for each procedure) and all associated procedural WARNINGS or NOTES.
- Before execution of a STEP within a procedure, completely read the left and right columns including any STEP specific WARNINGS or NOTES.

Note: If a procedural STEP fails to execute successfully, then please STOP and contact Oracle's Tekelec Customer Service for the assistance before attempting to continue.

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2.0 DISASTER RECOVERY SCENARIOS

PR 240952 documents a bug that makes DR procedure to fail when using TPD 6.5.1-82.27.0 for fresh installation of HLRR 4.0 server. Following is a workaround that needs to be executed on the newly replaced server after installing HLRR 4.0.0-40.15.0 application:

1. **Change to the directory**

   ```
   cd /etc
   ```

2. **Check out the profile script**

   ```
   rcstool co profile
   ```

3. **Edit this script with VIM editor**

   ```
   vim profile
   ```

4. **Add following lines at the bottom of the script**

   ```
   ######################################################
   # Source all of the files in the include directory
   #
   for file in /usr/local/etc/include/*.shrc
   do
       . ${file}
   done
   ```

5. **Check in the profile script**

   ```
   rcstool ci profile
   ```

6. **Reboot the server to take effect**

   ```
   init 6
   ```

2.1 Complete connectivity loss of NOAMP servers

2.1.1 Pre Condition

- NOAMP GUI is not accessible
- DR NOAMP GUI is accessible
- Provisioning clients are disconnected from the NOAMP
- PDB database provisioning has stopped

2.1.2 Recovery Steps

In order to quickly make NOAMP GUI accessible and provisioning to continue, DR NOAMP servers are activated and made to serve as NOAMP via following steps.

1 ☐	Disable the application on DR NOAMP servers.	This step ensures that DR NOAMP assumes NOAMP status in a controlled fashion. Disabling the application inhibits provisioning and can be started after successful validation. 1. Log in to the DR NOAMP GUI via the VIP address as the admin user. 2. Navigate to GUI page [Main Menu: Status & Manage → Server] 3. Select the row that has active DR NOAMP server. It will highlight 'Stop' button at the bottom. 4. Click 'Stop' and then click 'OK' At this time, HA switch over causes an automatic logout. 5. Login to DR NOAMP GUI as admin user 6. Repeat steps 3 and 4 for the new active DR NOAMP server. 7. Verify that 'Proc' column on both DR NOAMP servers shows 'Man' indicating that application is manually stopped.
2 ☐	SSH to VIP address of the DR NOAMP as root and make it new-NOAMP	1. Login via SSH to VIP IP of DR NOAMP server as root user. 2. Execute this command: **top.setPrimary** This step makes the DR NOAMP to take over as a new-NOAMP 3. System generates several replication and collection alarms as replication/collection links to/from former NOAMP servers becomes inactive.
3 ☐	Clear any persistent alarms	1. Wait at least 5 minutes for replication to re-sync ("inetmerge" or "inetrep" alarms may remain present). 2. If inetmerge or inetrep alarms persist beyond 5 minutes, then on the new-NOAMP active server, restart the corresponding processes: **pm.kill inetmerge** **pm.kill inetrep** Monitor alarms until they are all cleared
4 ☐	Verify replication	1. Monitor [Main Menu: Status & Manage → Server] screen at new-NOAMP. Note: It may take several minutes for replication, afterwards the "DB" and "Reporting Status" columns should show 'Normal'
5 ☐	Re-enable the application on the new-NOAMP using the Active new-NOAMP GUI.	1. Login to new-NOAMP GUI as admin user 2. Navigate to GUI page [Main Menu: Status & Manage → Server] 3. Select the active new-NOAMP server. This action highlights the 'Restart' button at the bottom. 4. Click 'Restart' and then click 'OK' 5. Verify that 'PROC' column now shows 'Norm'. 6. Repeat steps 3 to 5 for standby new-NOAMP server. 7. PDB provisioning can now resume to the VIP of the new-NOAMP.

6 ☐	Decrease the durability admin status, then reconfigure and reconnect the customer's provisioning clients.	1. Lower the durability admin status to (NO pair) to exclude former-NOAMP servers from the provisioning database durability. A value greater than 2 must be adjusted downward. 2. Login to new NOAMP GUI as admin user. 3. Navigate to GUI page [Main Menu: Administration → General Options] 4. Set **`cm.idb.durableAdminState`** to 2 (NO pair). 5. Click the 'OK' button to update. 6. Have customer reconfigure provisioning clients to connect to XMI VIP of the newly activated NOAMP servers. 7. Navigate to GUI page [Main menu: Eagle XG Database → Maintenance → PDBI → Command Log] 8. Verify that provisioning from clients have started. Check that new PDB commands have been executed
At this point, HLRR provisioning is fully functioning. The remaining steps will bring the old NOAMP site back into service as the new DR NOAMP site.		
7 ☐	Bring former-NOAMP back to service.	1. Determine what has happened to former-NOAMP site: NOAMP frame defective_____ NOAMP servers defective _____ Networking outage _____ Telco switch defective _____ 2. Based on the above disaster recovery scenario, execute procedure from this document to return the former-NOAMP servers and its site back to the service
8 ☐	Convert former-NOAMP servers to new DR NOAMP	1. Login via SSH to active former-NOAMP server as 'root' user. 2. Execute this command **`top.setSecondary`** This step allows the formerly NOAMP to become the DR NOAMP. 3. Monitor [Main Menu: Status & Manage → Server] screen at new DR NOAMP GUI. Note: It may take several minutes for replication, afterward the 'DB' and 'Reporting Status' columns should show 'Normal'
9 ☐	Stop Non-Service processes on DR NOAMP	1. Navigate to GUI page [Main Menu: Status & Manage → Server] and select the new active DR NOAMP server. 2. Press the 'Stop' button for new active DR NOAMP server (stops *all* processes) then press the 'OK' button to confirm. 3. On this GUI page [Main Menu: Status & Manage → Server] select new active DR NOAMP server. 4. Press the 'Restart' button for new DR NOAMP server (starts *only* Service processes) then press the 'OK' button to confirm. 5. Monitor this GUI page [Main Menu: Status & Manage → Server] for new active DR NOAMP server on GUI. 6. It may take a few seconds, but afterward the Application State should be 'Enabled' and the Alarm and Process Status columns should show 'Normal' 7. Repeat steps 1 to 6 for new standby DR NOAMP server.

10 ☐	Set the durability admin status to include DR NOAMP	1. If you have reduced the durability admin status in step 6, then raise the durability admin status to its former value (NO + DRNO) 2. Login to new NOAMP GUI as admin user. 3. Navigate to this GUI page [Main Menu: Administration → General Options] 4. Set the value of **`cm.idb.durableAdminState`** to **3** 5. Click the 'OK' button to update. Now, the new DR NOAMP servers are part of provisioning database durability.
11 ☐	Re-exchange SSH keys for PDB Import, PDB Export, PDE, and APDE features	1. Login to NOAMP GUI as admin user. 2. Re-exchange SSH keys for **`PDB Export`** using this GUI page [Main Menu: EAGLE XG Database → Configuration → PDBI → Options] 3. Re-exchange SSH keys for **`PDB Import`** using this GUI page [Main Menu: EAGLE XG Database → Configuration → PDBI → Options] 4. Re-exchange SSH keys for **`PDE`** using this GUI page [Main Menu: EAGLE XG HLR Router → PDE → Options] 5. Re-exchange SSH keys for **`Data Export (APDE)`** using this GUI page [Main Menu: Administration → Remote Servers → Data Export]
12 ☐	(optional) Clear alarm #14201 on DR-NOAMP site	If alarm 14201 was raised before by former NOAMP and now is shown on DR-NOAMP site, then manually clear this alarm. 1. SSH to DR-NOAMP server where alarm 14201 is still active 2. Execute this command to clear the alarm: **`alarm.put -e 14201 -s 5 -i PdeAgent`**

2.1.3 Post Condition

- GUI on the new NOAMP is accessible
- Provisioning clients are connected to the new NOAMP
- PDB database provisioning resumes
- New DR NOAMP GUI is accessible
- Replication and collection alarms have cleared
- NOTE: To swap new NOAMP and new DR NOAMP back to their original roles, run procedure 2.1.2 over again

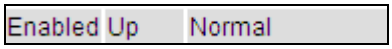
2.2 Replacement of an MP server

2.2.1 Pre Condition

- MP server has stopped processing traffic
- It has It has been determined to replace the defective MP server.
- A new replacement for defective MP server is available
- NOAMP GUI is accessible.

2.2.2 Recovery Steps

1 ☐	Prepare for server replacement.	Identify the defective MP server that needs replacement Hostname _____
2 ☐	Divert signaling traffic away from the MP that is being replaced.	Follow steps in Appendix D to divert signaling traffic away from the defective MP to avoid any message loss during the maintenance window activity.
3 ☐	Verify that no signaling traffic is processed at defective MP server.	1. Login to the SOAM GUI for the site where defective MP server is located. 2. Navigate to GUI page [Main Menu: Status & Manage → KPIs] and select 'EXHR' tab. 3. Verify following KPIs are now showing '0' for MP server: a. **ExhrGttPerformed** b. **ExhrGttExceptionRouting** c. **ExhrMlrPerformed**
4 ☐	Stop application software on MP server.	1. Navigate to GUI page [Main Menu: Status & Manage → Server] and select defective MP server by its hostname. 2. Click 'Stop' button followed by 'OK' on confirmation screen.
5 ☐	Power down and replace the defective MP server	1. Power down the defective MP server 2. Label all cables connected to the defective MP server 3. Physically remove the defective MP servers from the frame. 4. Follow reference [4] for the physical installation of the new MP server and reconnect all cables. 5. Power up the new MP server
6 ☐	Install and configure the new MP server and wait for it to complete replication sync.	1. Execute procedure 1 (Installing HLR Router application on MP server) from reference [1] 2. Execute procedure 5, steps 9 through 27 (Applying TKLCConfigData.sh file on MP server) from reference [1]. 3. Execute procedure 9, steps 17 through 25 (Restarting application on MP server) from reference [1]
7 ☐	Enable SS7 SCTP associations on newly installed MP server.	1. Login to SOAM GUI as admin user. 2. Navigate to GUI page [Main Menu: Transport Manager → Maintenance → Transport] and enable SCTP associations for the MP server.

8 ☐	Verify SS7 Link status and enable links.	1. Navigate to GUI page [Main Menu: SS7 / Sigtran → Maintenance → Links] and verify that links are all enabled on the MP server using SOAM GUI.  2. Enable links for the newly added MP server.
9 ☐	Bring signaling traffic back to MP.	Follow Appendix E and bring traffic back to MP.
10 ☐	Verify SS7 link status and traffic.	1. Navigate to GUI page [Main menu: SS7 / Sigtran → Maintenance → Links] and verify that all links are enabled and normal on the MP.  2. Navigate to GUI page [Main Menu: Status & Manage → KPIs], the select 'EXHR' tab and verify that 'ExhrGttPerformed' KPI is showing non-zero value for the MP's hostname.

2.2.3 Post Condition

- MP server is processing signaling traffic

2.3 Replacement of a SOAM server

2.3.1 Pre Condition

- SOAM server has stopped functioning
- It has been determined to replace the defective SOAM server
- New SOAM server replacement is available
- NOAMP GUI is accessible

2.3.2 Recovery Steps

1 ☐	Prepare for server replacement.	Identify the defective SOAM server that needs replacement Hostname = _____
2 ☐	Make the defective SOAM server "Forced Standby" so it does not become active.	1. Log in to the NOAMP GUI via the VIP address as the admin user. 2. Navigate to GUI page [Main Menu: Status & Manage → HA] 3. Click "Edit" button 4. Change "Max Allowed HA Role" of SOAM server to "Standby" 5. Click "Ok" button.
3 ☐	Remove the defective SOAM server from the server group.	1. Select [Main Menu: Configuration → Server Groups] screen. 2. Select server group of SOAM server. 3. Click "Edit" button. 4. Under 'SG Inclusion' uncheck SOAM server 5. Click "Ok" button
4 ☐	Power down and replace the defective SOAM server	1. Power down the defective SOAM server 2. Label all cables connected to the defective SOAM server 3. Physically remove the defective SOAM server from the frame. 4. Follow procedures in reference [6] to install and configure Quad Serial Card on the new SOAM server. 5. Follow reference [4] for the physical installation of the new SOAMP server and reconnect all cables. 6. Power up the new SOAM server
5 ☐	Install and configure the new SOAM server	1. Execute procedure 1 (Installing HLR Router application on SOAM server) from reference [1] 2. Execute procedure 5, steps 9 through 27 (Applying TKLCConfigData.sh file on SOAM server) from reference [1].

6 ☐	Inhibit DB Replication for all MP servers associated with the SOAM Network Element.	1. Log in to the NOAMP GUI via the VIP address as the admin user. 2. Navigate to GUI page [Main Menu: Status & Manage → Database] 3. Filter on the SOAM Network Element. 4. Record the MP server hostnames (Role: MP). 5. Click on "Inhibit Replication" button for each MP server until replications have been inhibited on all MP servers associated with the SOAM Network Element.
7 ☐	Add new SOAM server to the server group, and restart the application on new SOAM server	1. Execute procedure 8, steps 10 through 15 (Adding new SOAM server back to server group) from reference [1] 2. Execute procedure 8, steps 19 through 27 (Restarting application on new SOAM server) from reference [1]
8 ☐	Allow DB Replication for all MP servers associated with SOAM Network Element.	1. Log in to NOAMP GUI as admin user. 2. Navigate to GUI page [Main Menu: Status & Manage → Database] 3. Filter by SOAM network element scope and MP role. 4. Record the MP server hostnames associated with SOAM network element. 5. Click on "Allow Replication" button for each MP until replications on all MP servers associated with the SOAM Network Element have been allowed.
9 ☐	Re-exchange SSH keys for PDE feature	1. Login to NOAMP GUI as admin user. 2. Perform SSH key exchange for **PDE** using this GUI page [Main Menu: EAGLE XG HLR Router → PDE → Options]

2.3.3 Post Condition

- SOAM server is back in service

2.4 Replacement of a Query server

2.4.1 Pre Condition

- Query server has stopped functioning
- It has been determined to replace the defective Query server
- New Query server replacement is available

2.4.2 Recovery Steps

1 ☐	Prepare for server replacement.	Identify the defective Query server that needs replacement Hostname = _____
2 ☐	Power down and replace defective Query Server	1. Login to NOAMP GUI as admin user. 2. Navigate to GUI page [Main Menu: Configuration → Server Groups] 3. Select NOAMP's server group containing the defective Query Server. 4. Click "Edit" button. 5. Under 'SG Inclusion' uncheck the defective Query Server 6. Click "Ok" button
2 ☐	Power down and replace the defective Query Server	1. Power down the defective Query server 2. Label all cables connected to the defective Query server 3. Physically remove the defective Query server from the frame. 4. Follow reference [3] for the physical installation of the new Query server and reconnect all cables. 5. Power up the new Query server
3 ☐	Install and configure the new Query server	1. Execute Procedure 1 (Installing HLR Router Application) from reference [1]. 2. Execute procedure 5, steps 9 through 27 (Applying TKLCConfigData.sh file on Query server) from reference [1]
4 ☐	Add Query server to NOAMP server group and restart application on Query server	1. Execute procedure 8, steps 10 through 15 (Adding new Query server back to server group) from reference [1] 2. Execute procedure 8, steps 19 through 27 (Restarting application on new Query server) from reference [1]

2.4.3 Post Condition

- Query server is back in service

2.5 Replacement of a NOAMP server

2.5.1 Pre Condition

- NOAMP server has stopped functioning
- It has been determined to RMA the NOAMP server
- New NOAMP server replacement is available

2.5.2 Recovery Steps

1 ☐	Prepare for server replacement.	Identify the defective NOAMP server that needs replacement Hostname = _____
2 ☐	Make NOAMP server "Forced Standby" so it does not become active.	1. Login to the NOAMP GUI as admin user using VIP address. 2. Select [Main Menu: Status & Manage → HA] screen 3. Click 'Edit' button 4. Change "Max Allowed HA Role" of NOAMP-A server to 'Standby' 5. Click OK button
3 ☐	Remove NOAMP from the server group.	1. Select [Main Menu: Configuration → Server Groups] screen. 2. Select NOAMP's server group. 3. Click "Edit" button. 4. Under 'SG Inclusion', uncheck the defective NOAMP server 5. Click "Ok" button
4 ☐	Power down and replace the defective NOAMP server	1. Power down the defective NOAMP server 2. Label all cables connected to the defective NOAMP server 3. Physically remove the defective NOAMP server from the frame. 4. Follow procedures in reference [6] to install and configure Quad Serial Card on the new NOAMP server. 5. Follow reference [3] for the physical installation of the new NOAMP server and reconnect all cables. 6. Power up the new NOAMP server
5 ☐	Install and configure the new NOAMP server	1. Execute Procedure 1 (Installing HLR Router Application) from reference [1]. 2. Execute procedure 5, steps 9 through 27 (Applying TKLCConfigData.sh file on NOAMP server) from reference [1]
6 ☐	Inhibit DB replication for all MP servers network wide.	1. Login to NOAMP GUI as admin user. 2. Navigate to GUI page [Main Menu: Status & Manage → Database] 3. Click on "Inhibit Replication" button for each MP server (Role: MP) until all MP servers at each Network Element have been inhibited
7 ☐	Inhibit DB replication for all Query servers network wide.	1. Navigate to GUI page [Main Menu: Status & Manage → Database] 2. Click on "Inhibit Replication" button for each Query Server (Role: QUERY SERVER) until all Query Servers have been inhibited.

8 ☐	Inhibit DB replication for all OAM servers network wide.	1. Navigate to GUI page [Main Menu: Status & Manage → Database] 2. With the exception of the remaining NOAMP server, click on "Inhibit Replication" button for each OAM server (Roles: NETWORK OAM&P, and SYSTEM OAM) until all OAM servers at each Network Element have been inhibited.
9 ☐	Add new NOAMP server to the server group, and restart the application on new NOAM server	1. Execute procedure 8, steps 10 through 15 (Adding new NOAM server back to server group) from reference [1] 2. Execute procedure 8, steps 19 through 27 (Restarting application on new NOAMP server) from reference [1]
10 ☐	Allow DB replication for all OAM servers network wide.	1. Login to NOAMP GUI as admin user. 2. Navigate to GUI page [Main Menu: Status & Manage → Database] 3. Click on "Allow Replication" button for each OAM server (Roles: NETWORK OAM&P, and SYSTEM OAM) until all OAM servers at each Network Element have been allowed.
11 ☐	Allow DB replication for all MP servers network wide.	1. Navigate to GUI page [Main Menu: Status & Manage → Database] 2. Click on "Allow Replication" button for each MP server (Role: MP) until all MP servers at each Network Element have been allowed.
12 ☐	Allow DB replication for all Query servers network wide.	1. Navigate to GUI page [Main Menu: Status & Manage → Database] 2. Click on "Allow Replication" button for each Query server (Role: QUERY SERVER) until all query servers have been Allowed.
13 ☐	Re-exchange SSH keys for PDB Import, PDB Export, PDE, and Data Export (APDE) features	1. Login to NOAMP GUI as admin user. 2. Perform SSH key exchange for **`PDB Export`** using this screen [Main Menu: EAGLE XG Database → Configuration → PDBI → Options] 3. Perform SSH key exchange for **`PDB Import`** using this screen [Main Menu: EAGLE XG Database → Configuration → PDBI → Options] 4. Perform SSH key exchange for **`PDE`** using this screen [Main Menu: EAGLE XG HLR Router → PDE → Options] 3. Perform SSH key exchange for **`Data Export (APDE)`** using this screen [Main Menu: Administration → Remote Servers → Data Export]

2.5.3 Post Condition

- NOAMP server is back in service

2.6 Replacement of NOAMP server pair

2.6.1 Pre Condition

- NOAMP-A, NOAMP-B, and Query servers have stopped functioning
- DR NOAMP servers are not available or not installed
- It has been determined to replace defective NOAMP servers
- New NOAMP servers for replacement are available
- A recent backup archive of NOAMP configuration and provisioning data is available

2.6.2 Recovery Steps

1 ☐	Determine NOAMP backup archive	Make sure that you have access to the NOAMP backup archive file that contains both Provisioning and Configuration data. Noite: The backup archive file should be in uncompressed format.
2 ☐	Power down and remove defective NOAMP-A , NOAMP-B and Query servers. Replace them with new servers.	Perform following steps on the first NOAM-A server. 1. Power down the defective NOAMP-A server 2. Label all cables connected to the defective NOAMP-A server 3. Physically remove the defective NOAMP-A server from the frame. 4. Follow procedures in reference [6] to install and configure Quad Serial Card on the new NOAMP-A server. 5. Follow reference [3] for the physical installation of the new NOAMP-A server and reconnect all cables 6. Power up the new NOAMP-A server Repeat all above for NOAMP-B and Query server
3 ☐	Install and configure the new NOAMP-A server	1. Execute procedure 1 (Installing HLR Router Application on the new NOAMP-A server) from reference [1] 2. Execute procedure 4 (Configuring the new NOAMP-A server) from reference [1]
4 ☐	Copy NOAMP backup archive to the new NOAMP-A server.	1. Login via SSH to the console of new NOAMP-A server. 2. Copy the uncompressed backup archive identified in step 1 to newly installed NOAMP-A server on this location: **/var/TKLC/db/filemgmt** 3. Execute this command to stop running applications and leave database running: **prod.stop** 4. Restore configuration and provisioning database by executing this command: **idb.restore -n -t /var/TKLC/db/filemgmt -v <archive file>** 5. The NOAMP database is now restored 6. Start the application by executing this command **prod.start**

5 ☐	Install and configure the new NOAMP-B server	Follow recovery steps from section 2.5 to restore the NOAMP-B server
6 ☐	Install and configure the new Query server	Follow recovery steps from section 2.4 to restore the Query server

2.6.3 Post Condition

- NOAMP-A, NOAMP-B, and Query servers are back in service
- Provisioning clients are connected to NOAMP VIP address
- Provisioning continues

2.7 Replacement of SOAM server pair

2.7.1 Pre Condition

- Both SOAM-A and SOAM-B server have stopped functioning
- It has been determined to replace both SOAM servers
- New SOAM servers for replacement are available
- Access to NOAMP GUI is available
- MPs are not receiving provisioning database updates.

2.7.2 Recovery Steps

1 ☐	Determine if MPs should carry traffic during this procedure and divert signaling traffic away from MPs at this SOAM site	1. Identify all MPs at the SOAM site. 2. In absence of SOAMs, MPs will not get provisioning database updates. Poll customer to determine if traffic needs to be diverted away from these MPs. 3. Divert traffic away from the MPs by applying Appendix D on each MP.
2 ☐	Determine SOAM backup archive	Make sure that you have access to SOAMP backup archive file that contains only the Configuration data. This SOAM backup archive file should be in uncompressed format.
3 ☐	Prepare for server replacement.	Identify the SOAM servers that needs replacement Hostname of first SOAM-A server _____ Hostname of second SOAM-B server _____
4 ☐	Place first SOAM-A server in Forced Standby.	1. Log in to NOAMP GUI via the VIP address as the admin user. 2. Select [Main Menu: Status & Manage → HA] screen. 3. Click “Edit” button 4. Change ‘Max Allowed HA Role' of SOAM-A server to ‘Standby’ 5. Click “OK” button
5 ☐	Remove first SOAM-A server from the Server Group.	1. Select [Main Menu: Configuration → Server Groups] screen. 2. Select SOAM’s server group. 3. Click “Edit” button. 4. Under ‘SG Inclusion’ uncheck the first SOAM-A server 5. Click “Ok” button

6 ☐	Power down and remove defective SOAM-A and SOAM-B servers from the frame. Replace them with new SOAM-A and SOAM-B servers.	Perform following steps on the first SOAM-A server. 1. Power down the defective SOAM-A server 2. Label all cables connected to the defective SOAM-A server 3. Physically remove the defective first NOAMP-A server from the frame. 4. Follow procedures in reference [6] to install and configure Quad Serial Card on the new SOAM-A server. 5. Follow reference [4] for the physical installation of the new SOAM-A server and reconnect all cables 6. Power up the new SOAM-A Repeat all above for for the SOAM-B server
7 ☐	Install and configure software on first SOAM-A and second SOAM-B servers in the frame.	Perform following steps on the first SOAM-A server. 1. Execute procedure 1 (Installing HLR Router application on the first SOAM-A server) from reference [1] 2. Execute procedure 5, steps 9 through 27 (Applying TKLCConfigData.sh file on the first SOAM-A server) from reference [1]. Repeat all above steps on the second SOAM-B server.
8 ☐	Add SOAM-A server back to SOAM server group and restart the application on SOAM-A server	1. Execute procedure 8, steps 10 through 15 (Adding new SOAM-A server back to server group) from reference [1] 2. Execute procedure 8, steps 19 through 27 (Restarting application on new SOAM-A server) from reference [1]
9 ☐	Place second SOAM-B server in Standby	1. Log in to the NOAMP GUI via the VIP address as the admin user. 2. Select [Main Menu: Status & Manage → HA] screen. 3. Click “Edit” button 4. Change ‘Max Allowed HA Role' of SOAM-B server to ‘Standby’ 5. Click “OK” button
10 ☐	Remove second SOAM-B server from the Server Group.	1. Select [Main Menu: Configuration → Server Groups] screen. 2. Select SOAM’s server group. 3. Click “Edit” button. 4. Under ‘SG Inclusion’ uncheck SOAM-B server 5. Click “Ok” button
11 ☐	Inhibit database replication for all MP servers associated with the NE.	1. Go to the NOAMP GUI. 2. Select [Main Menu: Status & Manage → Database] screen 3. Filter on the SOAM Network Element. 4. Record the MP server hostnames (Role: MP). 5. Click “Inhibit Replication” button for each MP until all MP servers associated with the SOAM Network Element have been Inhibited.
12 ☐	Add second SOAM-B server back to the SOAM server group and restart application on the second SOAM-B server	1. Execute procedure 8, steps 10 through 15 (Adding new SOAM-B server back to server group) from reference [1] 2. Execute procedure 8, steps 19 through 27 (Restarting application on new SOAM-B server) from reference [1]

13 ☐	Verify that SOAM servers have received all NOAMP provisioning and configuration data from NOAMP.	1. Login to active SOAM GUI using VIP address. 2. Navigate to GUI page [Main Menu: Status & Manage → Servers] 3. Make sure that newly replaced SOAM-A and SOAM-B servers show 'Norm' for replication, collections and application status.
14 ☐	Restore the Configuration database on SOAM	Follow Appendix A to restore SOAM configuration data.
15 ☐	Allow database replication for all MP servers associated with the SOAM network element.	1. Go to the NOAMP GUI. 2. Navigate to GUI page [Main Menu: Status & Manage → Database] 3. Filter on the SOAM Network Element. 4. Record the MP server hostnames (Role: MP). 5. Click on "Allow Replication" button for each MP until replications on all MP servers associated with the SOAM Network Element have been allowed.
16 ☐	Bring traffic back on to the MPs	If traffic was diverted away in step 1, follow Appendix E to bring signaling traffic back to all MPs at the SOAM site

2.7.3 Post Condition

- Both SOAM-A and SOAM-B servers are back in service
- SOAM configuration changes can be made from SOAM GUI
- MPs are now receiving provisioning database updates.

2.8 Replacement of DR NOAMP server pair

2.8.1 Pre Condition

- DR NOAMP-A, DR NOAMP-B and DR Query servers have stopped functioning.
- It has been determined to replace the defective DR-NOAMP servers.
- New DR servers for replacement are available
- Access to Primary NOAMP GUI is functional

2.8.2 Recovery Steps

1 ☐	Prepare for server replacement.	Identify the DR NOAMP servers that needs replacement Hostname of first DR NOAMP-A server _____ Hostname of second DR NOAMP-B server _____ Hostname of DR Query server _____
2 ☐	Place DR NOAMP servers in Forced Standby	Log in to the NOAMP GUI via the VIP address as the admin user. Perform following steps for the first DR NOAMP-A server: 1. Select [Main Menu: Status & Manage → HA] screen 2. Click 'Edit' button 3. For first DR NOAMP server, change its "Max Allowed HA Role" to "Standby" 4. Click "OK" button Repeat all above steps for the second DR NOAMP-B server
3 ☐	Remove DR NOAMP-A, DR-NOAMP-B, and DR Query servers from the server group.	Perform following steps for the first DR NOAMP-A server: 1. Select [Main Menu: Configuration → Server Groups] screen 2. Select DR NOAMP's server group 3. Click "Edit" 4. Under 'SG Inclusion' uncheck the first DR NOAMP-A server 5. Click "Ok" button Repeat all above steps for the second DR NOAMP-B and DR Query servers.
4 ☐	Power down and remove old DR NOAMP-A, DR NOAMP-B and DR Query servers. Replace them with new servers	Perform following steps on the first DR NOAM-A server: 1. Power down the defective DR NOAMP-A server 2. Label all cables connected to the defective DR NOAMP-A server 3. Physically remove the defective DR NOAMP-A server from the frame. 4. Follow procedures in reference [6] to install and configure Quad Serial Card on the new DR NOAMP-A server. 5. Follow reference [3] for the physical installation of the new DR NOAMP-A server and reconnect all cables 6. Power up the new DR NOAMP-A Repeat all above for DR NOAMP-B and DR Query servers

5 ☐	Install and configure the new DR NOAMP-A server	Follow recovery steps from section 2.5 to restore the DR NOAMP-A server
6 ☐	Install and configure the new DR NOAMP-B server	Follow recovery steps from section 2.5 to restore the DR NOAMP-B server
7 ☐	Install and configure the new DR Query server	Follow recovery steps from section 2.4 to restore the DR Query server

2.8.3 Post Condition

- DR NOAMP-A, DR NOAMP-B and DR Query servers are back in service

2.9 Replacement of TELCO switch

2.9.1 Pre Condition

- TELCO switch has been identified to be defective
- Replacement TELCO switch is available
- OAM servers at the site are accessible

2.9.2 Recovery Steps

1 ☐	Prepare for TELCO replacement.	1. Identify the TELCO switch that needs replacement a. Determine if it is switch1A or switch1B at the site b. Determine if the site is NOAMP site or SOAM site 2. Poll customer to identify the archive of network configuration **vlan.conf** file used during the installation. NOTE: A previously saved **vlan.conf** file from the HLRR site located at **/var/TKLC/appw/vlan.conf** could be obtained and used for disaster recovery of a TELCO switch
2 ☐	Power down and replace the defective TELCO switch	1. Power down Telco switch 2. Label all cables connected to Telco switch. 3. Remove the defective Telco switch 4. Follow physical installation procedure for new Telco switch from - Reference [3] for NOAMP site or - Reference [4] for SOAM site.
3 ☐	Power up the Telco switch	Power on the Telco switch.
4 ☐	Configure TELCO switch	Use the vlan.conf file prepared in step 1 above for following steps: 1. If configuring switch 1A, follow procedure 2 (Configuring Telco Switch 1A) from reference [1] 2. If configuring switch 1B, follow procedure 3 (Configuring Telco Switch 1B) from reference [1]

2.9.3 Post Condition

- Telco switch is in service

2.10 Replacement of independent NOAMP frame

2.10.1 Pre Condition

- NOAMP frame is destroyed
- A replacement NOAMP frame with 2 NOAMP servers and a Query Server is available
- DR NOAMP-A, DR NOAMP-B, and DR Query servers are available
- User can access GUI of the DR-NOAMP

2.10.2 Recovery Steps

1 ☐	Determine NOAMP site and status of provisioning	If NOAMP frame is the Primary NOAMP frame, then execute procedure from section 2.1 to activate DR NOAMP site. This allows provisioning to continue and makes the defective frame a defective DR NOAMP frame.
2 ☐	Install new replacement frame	Follow procedure in reference [3] to install new NOAMP frame.
3 ☐	Configure switch1A	Follow recovery steps from section 2.9
4 ☐	Configure switch1B	Follow recovery steps from section 2.9
5 ☐	Recover DR NOAMP server pair	Follow recovery steps from section 2.8

2.10.3 Post Condition

- NOAMP frame is back in service and now serves as DR-NOAMP frame

2.11 Replacement of independent SOAM frame

2.11.1 Pre Condition

- SOAM frame is destroyed
- A replacement SOAM frame with 2 SOAM servers and MP servers is available

2.11.2 Recovery Steps

1 ☐	Install new SOAM frame	Follow procedure in reference [4] to install new SOAM frame.
3 ☐	Configure switch1A	Follow recovery steps from section 2.9
4 ☐	Configure switch1B	Follow recovery steps from section 2.9
5 ☐	Recover SOAM server pair	Follow recovery steps from section 2.7
6 ☐	Recover MP servers	For each MP server, follow recovery steps from section 2.2

2.11.3 Post Condition

- SOAM frame is back in service

2.12 Replacement of the combined NOAMP+SOAM frame

2.12.1 Pre Condition

- A combined NOAMP+SOAM frame is destroyed
- A replacement frame with 2 NOAMP servers, 1 Query Server (optional), 2 SOAM servers and MP servers is available
- DR-NOAMP servers are available
- User can access GUI of the DR-NOAMP

2.12.2 Recovery Steps

1 ☐	Determine NOAMP+SOAM site and status of provisioning	If NOAMP + SOAM frame is the primary NOAMP+SOAM frame, execute procedure from section 2.1 to activate DR NOAMP site. This allows provisioning to continue and makes the defective frame a defective DR NOAMP frame.
2 ☐	Install new replacement frame	Follow procedures in reference [4] to install the new combined NOAMP+SOAM frame.
3 ☐	Configure switch1A	Follow recovery steps from Section 2.9
4 ☐	Configure switch1B	Follow recovery steps from Section 2.9
5 ☐	Recover NOAMP server pair	Follow recovery steps from section 2.8
6 ☐	Recover Query server	Follow recovery steps from section 2.4
7 ☐	Recover SOAM server pair	Follow recovery steps from section 2.7
8 ☐	Recover MP servers	For each MP server, follow recovery steps from section 2.2

2.12.3 Post Condition

- A new combined NOAMP+SOAM frame is back in service

Appendix A. RESTORING SOAM CONFIGURATION DATABASE (SS7/TRANSPORT) FROM THE SANE BACKUP FILE

Use these instructions to restore the SOAM Configuration Database (SS7/Transport) at HLRR system. The SS7/Transport Configuration Database consists of Adjacent Nodes, Transports, Adjacent Server Groups, Local Signaling Points, Local SCCP Users, Remote Signaling Points, Remote MTP3 Users, Link Sets, Links, and Routes configured via SOAM GUI and/or command line interface.

1 ☐	Determine the impact of restored data on signaling traffic running on MP	1. Evaluate the impact of the restored data on MP server(s) on SOAM site. 2. It is advisable to divert traffic away from MP server(s) using **Appendix D** when performing the restore of database.
2 ☐	On the SOAM GUI, perform the actions to upload SS7/Transport backup archive file and verify it was uploaded successfully.	1. Login to the SOAM GUI via VIP address. 2. Identify the hostname of the active SOAM server Hostname = _____ 3. Navigate to GUI page [Main Menu: Status & Manage → Files] 4. Select the active SOAM server tab. 5. Click on the 'Upload' button. 6. Use 'Browse' button to select the backup archive containing SS7/Transport configuration database. 7. Click on the 'Upload' button to upload the backup archive file to the active SOAM server. 8. Verify that upload is complete and the backup archive file now shows up in the file list.
3 ☐	Execute a restore of SOAM configuration database.	1. Login to SOAM GUI via VIP address. 2. Navigate to GUI page [Main Menu: Status & Manage → Database] 3. Select the active SOAM server. Server is now highlighted. 4. Click 'Restore' button and select the backup archive file. 5. GUI will display compatibility information. If databases are not compatible, then call Oracle's Tekelec Customer Care Center before selecting a 'force' option. If 'force' option is used, then SS7/Transport configuration data needs manual modifications. 6. If the databases are compatible, then click 'OK' to continue with SS7/Transport database restoration. 7. If databases are shown as incompatible, then review and record incompatibility information. If 'server id' within topology check are shown to be incompatible, check 'force' option then click 'OK' to continue with DB restoration. 8. Wait for 5 minutes. There will be HA switch over for SOAM servers and you will have to log back in the SOAM GUI via VIP address again. Make sure that you are logging in to the same active server identified in Step 1 above.

4 ■	Check the status of SOAM database restore and rectify the SS7/Transport data if needed.	1. Login to SOAM GUI via VIP address. 2. Navigate to GUI page [Main Menu: Status & Manage → Database] 3. Click on "Info" button to verify that database restore has completed.  4. If 'force' option was used in step 3 above, then follow **Appendix B** to correct SS7 configuration data.
5 ■	Plan and replicate database down to MPs in controlled manner.	1. Login to NOAMP GUI via VIP address 2. Navigate to GUI page [Main Menu: Status & Manage → Database] 3. Allow replication to servers within SOAM site in following order: a. Select the 'Standby' SOAM server and click 'Allow replication' b. Select the first MP server at the same SOAM network element and click 'Allow replication'. c. Verify the functionality of first MP server and decide to roll out the restored data to all MP servers. d. Click 'Allow Replication' for all MPs. e. Select the active SOAM server and click 'Allow Replication'. 4. Enable site provisioning on SOAM site a. Log in to SOAM GUI via VIP address b. Navigate to GUI page [Main Menu: Status & Manage → Database]. c. Click 'Enable Site Provisioning' button. 5. Login to NOAMP GUI via VIP address 6. Navigate to GUI page [Main Menu: Status & Manage → HA] 7. For the standby SOAM server a. Click "Edit" button b. Change 'Max Allowed HA Role' of standby SOAM server to 'Active' c. Click "OK" button 8. SOAM configuration database restoration is complete.
6 ■	Restart MP application and bring traffic back to MP.	1. If MP traffic was diverted away in step 1, then for each MP at SOAM site do the following: a. Restart MP application on each MP at the SOAM site. i. On active NOAMP GUI select [Main Menu: Status & Manage → Server] screen ii. Select MP server iii. Click 'Restart' button b. Follow **Appendix E** to bring traffic back on the MP. 2. Repeat above actions for next MPs

Appendix B. CORRECTING SS7 CONFIGURATION DATA

When a SOAM backup performed in past is restored to newly recovered SOAM site, the Server ID mismatch could occur. In this situation a user could use 'force' option to restore SOAM configuration data and execute following procedure to correct SS7 configuration data.

<table>
<tr><td>1 ☐</td><td>Login to active SOAM server, and identify all MP servers enclosed in SOAM Network Element</td><td>1. Identify the hostname of active SOAM server
Hostname _____

2. Find the network element ID of the SOAM server:
iqt -z -f_h_NE_ID Server where "Hostname = '<SOAM Hostname>'"

3. Identify MP servers by this network element ID:
iqt -z -fHostname -f_h_Server_ID Server where "_h_NE_ID = <NEId> and Role = 'MP'"

4. Complete this list for each MP server on SOAM site:
<table><tr><th>Server</th><th>Hostname</th><th>Server ID</th></tr><tr><td>MP 1</td><td></td><td></td></tr><tr><td>MP 2</td><td></td><td></td></tr><tr><td>…</td><td></td><td></td></tr><tr><td>MP N</td><td></td><td></td></tr></table></td></tr>
<tr><td>2 ☐</td><td>Execute Step 3 through 6 for each of MP servers.</td><td>For each MP server defined in the above list, execute steps 3, 4 and 5 listed below</td></tr>
<tr><td>3 ☐</td><td>Find MP's server group ID</td><td>1. Find ServerGroup ID for the MP
iqt -z -f_h_SG_ID Server2SG where "_h_Server_ID = <ServerId of MP>"</td></tr>
<tr><td>4 ☐</td><td>Verify that Local Signaling Point code (LSP) assigned to MP has the same server ID.</td><td>1. Find the LSP ID for MP's LSP from LocalSP table.
iqt LocalSP

Note: The LSP ID is stored under "_h_LSP_ID" column/field name

2. Find the server group ID matching to MPs LSP ID.
iqt -p -z -f_h_SG_ID LSP2SG where "_h_LSP_ID = <LSPId of LSP that should belong to this MP>"

3. Verify that the server group ID of this LSP must match to the server group ID of this MP. If server group ID does not match, then correct the server group ID in "LSP2SG" table.
ivi LSP2SG

Note: The server group ID is stored under "_h_SG_ID" column/field name</td></tr>
</table>

5 ☐	Verify that transports hosted on this MP server have the same server ID.	1. For Local Associations that does not match the server IDs of local MP server, update server ID for that record. `ivi Transports` Note: Server IDs are stored under "_h_Server_ID" column/field name.
6 ☐	Login to SOAM GUI and execute the backup of SS7/Transport configuration database	1. Log into SOAM GUI via VIP address. 2. Navigate to GUI page [Main Menu: Status & Manage → Database] 3. Select the active SOAM server. 4. Click on 'Backup' button The "Database Backup" page appears 5. Select the data to be backed up as "Configuration" 6. Select the backup archive compression algorithm as "none" 7. Choose a name of the backup that will exclusively identify the backup. 8. Enter a comment in the Comment field to identify the backup file. 9. Click on 'Ok' button. 10. Wait for at least 5 minutes. 11. Navigate to GUI page [Main Menu: Status & Manage → Database]. 12. Click on 'Info' button and make sure the backup was successfully completed 13. Navigate to GUI page [Main Menu: Status & Manage → Files] 14. Under the active SOAM server tab, select the newly created backup file 15. Click "Download" button 16. A pop-up window appears 17. Click "Save As" button to offload the backup file to a secure location.

Appendix C. RESTORING NOAMP PROVISIONING DATABASE FROM BACKUP

Use these instructions to restore NOAMP Provisioning Database (PDB) at HLRR system. The Provisioning Database consists of DNs, IMSIs and Network Entities configured via PDBI and/or NOAMP GUI.

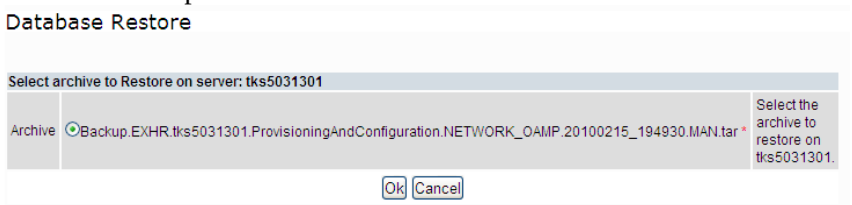
1 ■	Identify hostname of active NOAMP server	1. Determine the hostname of the active NOAMP Server Hostname _____
2 ■	Identify and copy the backup archive to the active NOAMP server.	1. Identify and locate NOAMP provisioning database backup archive file stored in the uncompressed format. 2. Use scp or sftp to copy the backup archive file to the following directory on active NOAMP server: /var/TKLC/db/filemgmt
3 ■	Execute a restore of NOAMP provisioning database.	1. Login to NOAMP GUI via VIP address. 2. Navigate to GUI page [Main Menu: Status & Manage → Database] 3. Select the active NOAMP server. Server is now highlighted. 4. Click 'Restore' button 5. Select the desired provisioning database backup archive file 6. GUI displays compatibility information. If databases are not compatible, then stop and call Oracle's Tekelec Customer Care Center before selecting a 'force' option. 7. If the databases are compatible, click 'OK' to continue with database restoration. 8. Wait for ~5 minutes until database restore is complete Note: Database restore process could be a long operation. There will be HA switchover for NOAMP servers and you will have to log back in the NOAMP GUI via VIP address again. Make sure that you are logging in to the same active server identified in Step 1 above. During the database restoration, provisioning from GUI or via PDBI remains disabled. Replication of data down to SOAM sites is also disabled.
4 ■	Check database restore completion and start PDBI provisioning	1. Log back in to NOAMP GUI via VIP address. 2. Navigate to GUI page [Main Menu: Status & Manage → Database] 3. Click on the "Info" button to verify that database restore has completed successfully.  4. Click 'Enable site provisioning' button to enable site provisioning. Note: External provisioning clients can now connect via PDBI and start updates to provision HLRR database.

5 ■	Plan and replicate database to rest of the servers including Signaling NEs in controlled manner.	1. Log in to NOAMP GUI via VIP address. 2. Navigate to GUI page [Main Menu: Status & Manage → Database] 3. Select active NOAMP server. a. Click 'Allow Replication'. b. Click 'OK'. 4. Select first SOAM site to replicate newly restored provisioning database. a. Select the standby SOAM server i. Click 'Allow Replication' ii. Click 'OK' b. Select the first MP server at the same SOAM network element i. Click 'Allow Replication' ii. Click 'OK' c. Verify the functionality of first MP server and decide to roll out the restored data to all MP servers. d. Repeat (b) and (c) for all MPs. e. Select the active SOAM server i. Click 'Allow Replication' ii. Click 'OK'. 5. Verify that first SOAM site is processing traffic with new provisioning database correctly. 6. Repeat step 2 for each remaining SOAM sites. 7. Select 'standby' NOAMP server a. Click 'Allow replication' b. Click 'OK'. 8. Select Query Server a. Click 'Allow replication' b. Click 'OK'. 9. Select DR NOAMP servers one at a time (active 1st, then standby 2nd) a. Click 'Allow replication' b. Click 'OK'. 10. Navigate to GUI page [Main Menu: Status & Manage → HA] 11. For the standby NOAMP server a. Click "Edit" button b. Change 'Max Allowed HA Role' of standby NOAMP server to 'Active' c. Click "OK" button 12. NOAMP provisioning database restoration now is complete.
1 ■	Identify and copy the backup archive to the active NOAMP.	1. Identify an archived NOAMP provisioning database in uncompressed format. 2. Use scp or sftp to copy the backup archive to the */var/TKLC/db/filemgmt* directory on active NOAMP server.

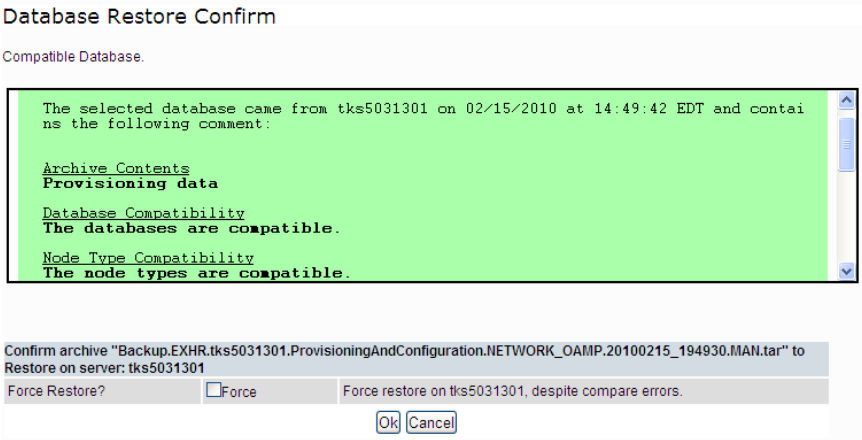
2 ■ Execute a restore of NOAM provisioning database.

1. Login to NOAMP GUI via XMI VIP address. Note the active NOAMP Server
   Active NOAMP = _____
2. Select 'Status-Manage→Database' screen
3. Select the active NOAMP server. Server is now highlighted with background color.
4. Click 'Restore' button

5. Select the backup archive



6. GUI displays compatibility information. If databases are not compatible, call Tekelec Customer Care Center before selecting a 'force' option.



7. If the databases are compatible, click 'OK' to continue with DB restoration.
8. DB restore is a long operation. Wait for 5 minutes. There will be HA switch over for NOAMP servers and you will have to log back in the NOAMP GUI via XMI VIP address again. Make sure that you are logging in to the same active server as Step 1 above. During restoration, provisioning from GUI or via PDBI remains disabled. Replication of data down to SOAM sites is also disabled.

3 ■ Check DB restore completion and start PDBI provisioning

1. Log back in to NOAMP GUI via XMI VIP.
2. Select 'Status-Manage→Database" screen and make sure that DB restore has completed.

3. Click 'Enable provisioning' to enable provisioning.

External provisioning clients can now connect via PDBI and start provisioning updates to provision database.

4 ■	Plan and replicate database to rest of the servers including Signaling NEs in controlled manner.	13. Log in to NOAMP GUI via XMI VIP address. 14. Select active NOAMP. a. Click 'Allow Replication'. b. Click 'OK'. 15. Select first SOAM site to replicate newly restored provisioning database. a. Select the standby SOAM server and i. Click 'Allow Replication' . ii. Click 'OK' b. Select the first MP server at the same SOAM network element i. Click 'Allow Replication' ii. Click 'OK' c. Verify the functionality of first MP server and decide to role restored data to all MP servers. d. Repeat (b) and (c) for all MPs. e. Select the active SOAM server i. Click 'Allow Replication' ii. Click 'OK'. 16. Verify that first SOAM site is processing traffic with new provisioning database correctly. 17. Repeat step 2 for each remaining SOAM sites. 18. Select 'forced standby' NOAMP server a. Click 'Allow replication' b. Click 'OK'. 19. Select Query Server a. Click 'Allow replication' b. Click 'OK'. 20. Select DR NOAMP servers one at a time a. Click 'Allow replication' b. Click 'OK'. 21. Select 'Status-Manage→HA' screen to remove 'forced standby' from standby NOAMP server. For the standby NOAMP server a. Click "Change" b. Check "Forced Standby" c. Click "Apply" 22. NOAMP provisioning database restoration is complete.

Appendix D. DIVERTING SIGNALING TRAFFIC AWAY FROM THE MP

When doing maintenance activity on affected MP server, it is recommended to divert the signaling traffic away from the affected MP server until the maintenance activity is complete. This is to eliminate traffic loss at the affected MP server.

1 ☐	Identify the hostname of the affected MP server	Identify the hostname of the affected MP server Hostname _____
2 ☐	Determine True Point Code (TPC) and Capability Point Code (CPC) of the affected MP server.	1. Login to the SOAM GUI via VIP address for the site where the affected MP is located. 2. Navigate to GUI page [Main Menu: Configuration → Server Groups] and determine MP server's group name. 3. Navigate to GUI page [Main Menu: SS7 / Sigtran → Configuration → Local Signaling Points] and determine True Point Code (TPC) and Capability Point Code (CPC) for this MP server group: MP server's TPC = _____ MP server's CPC = _____
3 ☐	Identify Eagle STPs that are connected to the affected MP server, and determine their Point Codes.	1. Navigate to GUI page [Main Menu: Transport Manager → Configuration → Transport] 2. Set the filter to MP's hostname, and determine 'Adjacent Node' names of Eagle STPs. 3. Cross reference the 'Adjacent Node' names of Eagle STPs with [Main Menu: SS7/Sigtran → Configuration → Adjacent Server Groups] screen and determine 'Adjacent Server Group' names of Eagle STP. 4. Cross reference the 'Adjacent Server Group' name with [Main Menu: SS7/Sigtran → Configuration → Remote Signaling Points] screen and determine MTP Point Codes of Eagle STPs connected to this MP server: Eagle STP-1 MTP Point Code = _____ Eagle STP-2 MTP Point Code = _____ … Eagle STP-N MTP Point Code = _____
4 ☐	Divert signaling traffic away from the affected MP server at the Eagle STP. Execute these steps at each Eagle STP connected to this MP server.	The signaling traffic to the affected MP server can be diverted away in 2 steps: 1. Increase the relative cost of the link set to MP server's True Point Code (TPC) for route to MP's Capability Point Code (CPC) by issuing this command on Eagle STP terminal: **chg-rte** 2. Wait for ~30 seconds and then disable the link going to MP server's True Point Code (TPC) by issuing this command on Eagle STP terminal: **dact-slk** Note: For more info see "Eagle STP Commands Manual" [7]

Appendix E. BRINGING SIGNALING TRAFFIC BACK TO THE MP

After the maintenance activity on the affected MP server is completed, the signaling traffic can be brought back to the affected MP server by using the following steps.

1 ☐	Identify the hostname of the affected MP server	Identify the hostname of the affected MP server Hostname _____
2 ☐	Determine True Point Code (TPC) and Capability Point Code (CPC) of the affected MP server	1. Login to the SOAM GUI via VIP address for the site where the affected MP is located. 2. Navigate to GUI page [Main Menu: Configuration → Server Groups] and determine MP server's group name. 3. Navigate to GUI page [Main Menu: SS7/Sigtran → Configuration → Local Signaling Points] and determine True Point Code (TPC) and Capability Point Code (CPC) for the MP server group: MP server's TPC = _____ MP server's CPC = _____
3 ☐	Identify Eagle STPs that are connected to the affected MP server, and determine their Point Codes.	1. Navigate to GUI page [Main Menu: Transport Manager → Configuration → Transport]. 2. Set the filter to MP's hostname, and determine 'Adjacent Node' names of Eagle STPs. 3. Cross reference the 'Adjacent Node' names of Eagle STPs with [Main Menu: SS7/Sigtran → Configuration → Adjacent Server Groups] screen and determine 'Adjacent Server Group' names of Eagle STP. 4. Cross reference the 'Adjacent Server Group' name with [Main Menu: SS7/Sigtran → Configuration → Remote Signaling Points] screen and determine MTP Point Codes of Eagle STPs connected to this MP server: Eagle STP-1 MTP Point Code = _____ Eagle STP-2 MTP Point Code = _____ … Eagle STP-N MTP Point Code = _____
4 ☐	Bring signaling traffic back to the affected MP server at the Eagle STP. Execute these steps at each Eagle STP connected to this MP server.	The signaling traffic to the affected MP server can be brought back in 2 steps: 1. Reduce the relative cost (to pre-maintenance value) of link set to MP server's TPC for route to MP's Capability Point Code (CPC) by issuing this command on Eagle STP terminal: **chg-rte** 2. Wait for ~30 seconds and then enable the link going to MP server's True Point Code (TPC) by issuing this command on Eagle STP terminal: **act-slk** Note: For more info see "Eagle STP Commands Manual" [7]