Notes on Using This Manual

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Related Documents

- Express5800/A1040c, A2040c, A2020c, A2010c User’s Guide
1. Introduction

1.1 What is PCIe Live Error Recovery?

PCIe Live Error Recovery is a feature to improve the I/O availability. In the event of a critical/uncorrectable failure occurs to an adapter, the feature will bring down the PCIe link associated with the failed root port within one cycle and automatically reinitialize the adapter in the case of the intermittent failure to maintain. Without this feature, if a critical I/O failure occurs to the adapter, the system will be down. This feature improves more the I/O availability by a combination of redundant I/O features such as NIC Teaming.

1.2 Operating Environment

PCIe Live Error Recovery operating environment as shown below:

Table 1-1 Operating Environment

| Hardware (Server) | Express5800/A2040c |
|-------------------|-------------------|---|
|                   | Express5800/A2020c |
|                   | Express5800/A2010c |
|                   | Express5800/A1040c |
| OS                | Red Hat Enterprise Linux 6.8 |

1.3 Supported Cards

PCIe Live Error Recovery supported cards as shown below:

Table 1-2 Supported Cards

| Network Card          | 10GBASE (SFP+/2ch) |
|-----------------------|-------------------|---|
|                       | -NE3304-149 |
| Fibre Channel Card    | Fibre Channel Controller (1ch,8G) |
|                       | -NE3390-159 |
|                       | Fibre Channel Controller (2ch,8G) |
|                       | -NE3390-160 |
|                       | Fibre Channel Controller (1ch,16G) |
|                       | -NE3390-157A |
|                       | Fibre Channel Controller (2ch,16G) |
|                       | -NE3390-158A |
1.4 Terminology

Terms used in Mission Critical I/O Failover as shown below:

Table 1-3 Terminology

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonding</td>
<td>Bonding is standard NIC teaming in Linux.</td>
</tr>
<tr>
<td>SPS</td>
<td>StoragePathSavior (SPS) is a software to multiplex paths between a server and storage unit in a system with Express5800 and the NEC Storage series Disk Array Subsystem.</td>
</tr>
<tr>
<td>Failover</td>
<td>Traffic failover to prevent connectivity loss in the event of a network component failure.</td>
</tr>
<tr>
<td>LER mode</td>
<td>LER mode is Live Error Recovery mode. Setting LER mode enables PCIe Live Error Recovery. When uncorrected error is occurred in the PCIe slot set as LER, the feature will bring down the PCIe link, automatically reinitialize the adapter in the case of the intermittent failure.</td>
</tr>
<tr>
<td>NoLER mode</td>
<td>Setting NoLER mode disables Mission Critical I/O Failover. When uncorrected error is occurred in the PCIe slot set as NoLER, the system will be rebooted.</td>
</tr>
<tr>
<td>LER / NoLER slot</td>
<td>LER slot is the PCIe slot set as LER. NoLER slot is the PCIe slot set as NoLER.</td>
</tr>
<tr>
<td>Web console</td>
<td>A tool used to view or configure the server via web browser provided by EXPRESSSCOPE Engine SP3.</td>
</tr>
<tr>
<td>necpciras</td>
<td>Command used for configuring LER mode.</td>
</tr>
</tbody>
</table>

1.5 Access Limitation

Operation related to Mission Critical I/O Failover feature is allowed for the user having administrative right (Administrator account).
2. Installing necpciras

This section describes how to install, uninstall, and upgrade necpciras command.

2.1 Installing necpciras

1. Login to the target machine as a root user.
2. Copy the file necpciras-*.*.x86_64.rpm to desired directory in target machine. (* represents revision number.)

```
# rpm -ivh necpciras-3.0-1.02.el7.x86_64.rpm
Preparing...  ################################################################## [100%]
1:necpciras  ################################################################## [100%]
```

3. Run the following command to check if neccapd package is installed correctly.

```
# rpm -qa |grep necpciras
necpciras-3.0-1.02.el7.x86_64
```

2.2 Uninstalling necpciras

1. Login to the target machine as a root user.
2. Uninstall necpciras package by running rpm command.

```
# rpm -e necpciras
```

3. Run the following command to check if neccapd package is installed correctly.

```
# rpm -qa |grep necpciras
```

Uninstallation is completed successfully if no response is displayed against the command.

Important  Configuration by necpciras command is preserved after uninstallation.

2.3 Upgrading necpciras

Upgrade necpciras as follows:
Uninstall the old necpciras package according to "2.2 Uninstalling necpciras", then install the new necpciras according to "2.1 Installing necpciras".
2.4 Configuration by necpciras

necpciras command is used to display information related to PCIe Live Error Recovery feature and to set LER mode settings.


| Important | Some settings require to system (OS) reboot to apply the settings. |
| Important | Factory default setting is NoLER mode. |

**Table 2-1 necpciras command options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Use case</th>
<th>Reboot</th>
</tr>
</thead>
<tbody>
<tr>
<td>--set-ler</td>
<td>Use this option to set PCIe slots as LER mode.</td>
<td>Required</td>
</tr>
<tr>
<td>--set-noler</td>
<td>Use this option to set PCIe slots as NoLER mode.</td>
<td>Required</td>
</tr>
<tr>
<td>--reset</td>
<td>Use this option to restore factory default settings.</td>
<td>Required</td>
</tr>
<tr>
<td>--set-threshold</td>
<td>Use this option to specify recovery threshold of uncorrected error.</td>
<td>Required</td>
</tr>
</tbody>
</table>

| Important | LER Mode must be set to supported cards only for PCIe Live Error Recovery. |
| Important | Reboot or shutdown the system before starting backup process. |

**Tips**

This feature improves more the I/O availability by a combination of redundant I/O features such as NIC Teaming.

2.5 Backup Configuration Information

Information configured by necpciras is stored in hardware of the server, not in the file system of OS. If you change configuration information, be sure to backup the configuration information using web console.

| Important | Reboot or shutdown the system before starting backup process. |

Described below is procedure to backup configuration information using web console.

Refer to "Express5800/A1040c, A2040c, A2020c, A2010c User’s Guide" for detailed information and operation screen images.

**Backup procedure**

1. Reboot or shutdown the system.
2. Select the [Configuration] on web console.
4. Press the [Backup] button to download the file containing configuration information.

Refer to "Express5800/A1040c, A2040c, A2020c, A2010c User's Guide" for how to restore the configuration information using the backup file obtained from web console.
3. **Necpciras Command Reference**

This section describes details of necpciras command used to view or configure information related to Mission Critical I/O Failover. For how to install necpciras, see “2.1 Installing necpciras”.

3.1 **necpciras command line format**

necpciras subcommand [<options>]

subcommand:

```
--show ...

--set-ler=<PCI SLOT NUMBERS> ...

--set-noler=<PCI SLOT NUMBERS> ...

--set-threshold=<THRESHOLD> ...

--reset ...

--version ...
```

PCI SLOT NUMBERS: List the number of PCIe slots delimiting with slash.

THRESHOLD: Recovery threshold

3.2 **--show option**

Shows the current settings of PCIe Live Error Recovery feature.

**Suboption**

None

**Execution result**

```
# ./necpciras --show
LER Settings:
---------------------------------------------------------------------
Slot  Status  LER LER
---------------------------------------------------------------------
PCI1  Enable  No  No
PCI2  N/A     No  No
PCI3  Enable  No  No
PCI4  N/A     No  No
PCI5  N/A     No  No
PCI6  N/A     No  No
PCI7  N/A     No  No
PCI8  N/A     No  No
PCI9  N/A     No  No
PCI10 N/A     No  No
PCI11 N/A     No  No
PCI12 N/A     No  No
PCI13 N/A     No  No
PCI14 N/A     No  No
PCI15 N/A     No  No
PCI16 N/A     No  No

LER threshold Setting:
---------------------------------------------------------------------
Current  Next
---------------------------------------------------------------------
Threshold 1   1
```

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### Description

**Table 3-1 necpciras –show option**

<table>
<thead>
<tr>
<th>Item</th>
<th>Displayed character string</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slot Status</td>
<td>Enable</td>
<td>The PCIe slot is available.</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>The PCIe slot is not available.</td>
</tr>
<tr>
<td>LER Current</td>
<td>Yes</td>
<td>The PCIe slot is set as LER mode.</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>The PCIe slot is set as NoLER mode. Empty PCIe slot is displayed as NoLER mode.</td>
</tr>
<tr>
<td>LER Next</td>
<td>Yes</td>
<td>The PCIe slot will be set as LER mode on next boot or PCIe hot-add.</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>The PCIe slot will be set as NoLER mode on next boot.</td>
</tr>
<tr>
<td>Threshold</td>
<td>Current Value</td>
<td>Current recovery threshold is shown. Recovery will be performed until the threshold.</td>
</tr>
<tr>
<td>Next</td>
<td>Value</td>
<td>Next recovery threshold is shown on next boot.</td>
</tr>
</tbody>
</table>

#### 3.3 --set-ler option

Specify LER mode of each PCIe slot.

- **Important**
  - LER Mode must be set to supported cards for PCIe Live Error Recovery.

- **Tips**
  - This feature improves more the I/O availability by a combination of redundant I/O features such as NIC Teaming.

- **Important**
  - Reboot the system to apply the settings.

**Suboption**

- `--set-ler=<PCI SLOT NUMBERS>` (Ex. `--set-ler=9/10`)
  - Specify the PCIe slot numbers of LER slot, by delimiting with the slash.

**Execution result**

When command is executed successfully, the same contents as --show option is displayed.

If command fails due to an illegal argument or others, an error message or usage of necpciras is displayed.
Tips

Empty PCIe slot is allowed to be set as LER mode. When PCIe Hot-Add, the slot will be set as LER mode.

3.4 --set-noler option

Specify NoLER mode of each PCIe slot.

Important

Reboot the system to apply the settings.

Suboption

- --set-noler=<PCI_SLOT_NUMBERS>  (e.g. --set-ler=9/10)
  Specify the PCIe slot numbers of NoLER slot, by delimiting with the slash.

Execution result

When command is executed successfully, the same contents as --show option is displayed.

If command fails due to an illegal argument or others, an error message or usage of necpciras is displayed.
3.5 --set-threshold option

Specify recovery threshold of uncorrected error. Recovery will be performed until the threshold. The number of recovery will be counted for each slot. If the number of recovery exceeded the threshold in a certain slot, the system will be down in order to prevent unsafe recovery. If recovery threshold is zero, recovery will done up to infinity.

Example: If the threshold is 3 and the uncorrectable error occurs 3 times on the PCIe slot 9, recovery will be performed for 3 times in PCIe slot 9. Then if the 4th uncorrectable occurs on the PCIe slot 9, the system will be down.

Tips

If in the same PCIe card error occurred repeatedly, there is a high possibility of complete failure. In this case, downing system may be safer than running. Determine the threshold according to the use environment. Default recovery. Default recovery threshold is one.

Important

Reboot the system to apply the settings.

Suboption

- --set-threshold=<THRESHOLD> (e.g. --set-threshold=3)
  Specify the decimal recovery threshold

Execution result

When command is executed successfully, the same contents as --show option is displayed.

If command fails due to an illegal argument or others, an error message or usage of necpciras is displayed.
# ./necpciras --set-threshold=3

LER Settings:

<table>
<thead>
<tr>
<th>Slot</th>
<th>Status</th>
<th>LER Current</th>
<th>LER Next</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI1</td>
<td>Enable</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI2</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI3</td>
<td>Enable</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI4</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI5</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI6</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI7</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI8</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI9</td>
<td>Enable</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PCI10</td>
<td>Enable</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PCI11</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI12</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI13</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI14</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI15</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI16</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

LER threshold Setting:

<table>
<thead>
<tr>
<th>Current</th>
<th>Next</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold</td>
<td>1</td>
</tr>
</tbody>
</table>

** NOTICE **
The configuration changes have not been applied yet.
You must reboot the system to apply them.

### 3.6 --reset option

Reset ler settings.

**Important** Reboot the system to apply the settings.

**Suboption**

None

**Execution result**

LER settings are reset. And the same contents as --show option is displayed.

If command fails due to an illegal argument or others, an error message or usage of necpciras is displayed.
# ./necpciras --reset
LER Settings:

<table>
<thead>
<tr>
<th>Slot</th>
<th>Status</th>
<th>Current</th>
<th>Next</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI1</td>
<td>Enable</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI2</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI3</td>
<td>Enable</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI4</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI5</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI6</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI7</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI8</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI9</td>
<td>Enable</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>PCI10</td>
<td>Enable</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>PCI11</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI12</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI13</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI14</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI15</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PCI16</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

LER threshold Setting:

<table>
<thead>
<tr>
<th>Current</th>
<th>Next</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold</td>
<td>3</td>
</tr>
</tbody>
</table>

** NOTICE **
The configuration changes have not been applied yet.
You must reboot the system to apply them.

### 3.7 --version option

Shows version information of necpciras.

**Suboption**

None

**Execution result**

The version information is displayed by the following format:

```bash
# ./necpciras --version
necpciras Version 1.3
```

### 3.8 Usage

If command fails due to an illegal argument or others, usage of necpciras is displayed.

**Suboption**

None
**Execution result**

```
# ./necpciras
Usage:/necpciras --show
Usage:/necpciras --reset
Usage:/necpciras --set-ler=<PCI SLOT_NUMBERS>
Usage:/necpciras --set-noler=<PCI SLOT_NUMBERS>
Usage:/necpciras --set-threshold=<THRESHOLD>

Default value of LER Setting is "No".
<PCI SLOT_NUMBERS> is pci slot numbers separated by a slash.
ex) --set-ler=1/6 : slot1 and slot6 are set to LER.

<THRESHOLD> is LER threshold value of 0 - 255. Default value is "1".
0 : No specified threshold. PCI Error Recovery will be performed for every uncorrectable error.
1 - 255 : Specify threshold value.
ex) --set-threshold=1 : PCI Error Recovery will be performed only for 1st uncorrectable error.
ex) --set-threshold=2 : PCI Error Recovery will be performed for 1st and 2nd uncorrectable error.
```