iSSDv2.0 RELEASE NOTES

Version 1.0

15th May, 2017

Release Notes for iSSD v2.0

(NVMe based intelligent SSD Card)

Revision History:

Date	Rev No.	Description	By
15-May-2017	1.0	Release Notes document for iSSDv2.0 (NVMe based intelligent SSD Card)	VVDN Technologies

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1 Introduction

This document provides release details for the LS2088a NVMe based iSSD project.

2 Release features

2.1 Board support packages

- Dual Boot partitions
- Firmware upgrade with binary tar ball
- Factory Default in bank 0
- BSP for iSSD(U-Boot, Linux and file system)
- Software versioning

2.1.1 Release 1.0

- LS2088A default SDK is used
- Supports three operation mode as inic, issd, issd-sa, are selectable at boot time. Stops at u-boot and '`setenv bootimg issd`' and '`saveenv`'.
- iSSD Standalone mode (issd-sa) : NVMe host driver runs on ls2 and expose the FPGA DDR on it as nvme block device(/dev/nvme0n1). RoCE can use this nvme block device.

2.2 iNIC

Detailed information about features implementations are elaborated in the document "***LS2085_iNIC_Feature_Test_Guide_A0-01.pdf***". The implementation is same in LS2088 also.

2.3 RoCE

- Functionality test applications like "rping" are added.
- "qperf" is added for benchmarking.
- "ISER" (iSCSI Extensions for RDMA) is implemented for creating SAN (Storage Area Network).

Note: Detailed information about the test setup and the test procedures are elaborated in the document "***LS2_iSSD_RoCE_implementation_and_testing_guide_A0-01.pdf***"

2.4 NVMe

- All mandatory Admin Commands are added.
- All mandatory NVM Commands are added.

2.4.1 Release 1.0

- LS2 DDR is used as NVMe storage in standalone mode.
- FPGA DDR and NAND are used as storage in iSSD mode.

3 Bug fixes, known issues and limitations

3.1 iNIC

Detailed information about bug fixes, known issues and limitations are elaborated in the document "***LS2085_iNIC_Feature_Test_Guide_A0-01.pdf***"

3.1.1 Release 1.0

- The iNIC feature cannot be tested with x86 machine since the PCIe outbound mapping is not working. Fix will be given in next release.
- iNIC feature between two LS2s can be used

3.2 RoCE

Following are the bugs faced and their respective fixes

Bug 1:

When udp tunnel queuing fails then on the next run of rxe_arbiter is run from rxe_arbiter_timer() which was set sometime back in past and list_empty(&rxe->arbiter.qp_list) will be true in this run , because list_add_tail(qpl, &rxe->arbiter.qp_list) is not called on failure.

This halts scheduling of arbiter because of two reasons

1. Timer is not set from now , so rxe_arbiter_timer() will not run again , so rxe_arbiter is not scheduled
2. arbiter_skb_queue will schedule arbiter only if arbiter.skb_count is made to 1 from 0, which is not going to occur.

File : <kernel-directory>/drivers/infiniband/hw/rxe/rxe_arbiter.c

Function :rxe_arbiter()

Fix 1 :

1. Perform list_add_tail(qpl, &rxe->arbiter.qp_list) which allows to make qp_list non empty and arbiter will definitely attempt to queue skb to udp_tunel.
2. set timer which calls rxe_arbiter_timer() on timeout .

Bug 2:

Packet psn would be requstedpsn, but resource is not related to the requested packet, since resource not cleared for the request for which RNR_NAK was sent.

File : <kernel-directory>/drivers/infiniband/hw/rxe/rxe_resp.c

Function :read_reply()

Fix 2 :

Adjusting code flow, all requests to bypasscheck_psn() till Request for which RNR_NAK was send is completed.

- Drop all the requests above the PSN for which RNR_NAK was sent (No need as these request will come again).
- Allow Duplicate Packets to be processed (The requests before RNR_NAK can be processed)
- Allow the subset of request for which RNR_NAK was sent and clear sent_psn_rnr_nak.
- Coded to prevent the formation of faulty headers, which occured in default code
- Added fields in the structure rxe_resp_info for storing NAK details

Bug 3:

Retrial with wrong DMA LENGTH (when subset of earlier request is made, full DMA length was used)

File : <kernel-directory>/drivers/infiniband/hw/rxe/rxe_req.c

Function :req_retry()

Fix 3 :

Reduce the DMA LENGTH for the subset of request

Expected errors:

When the packets are dropped by any of the NIC, then we cannot recover the RC (Reliable Connection) connection beyond a point ie., if Resource for the Request is cleared and a duplicate request comes for the cleared resource, then the request is silently dropped. This may lead to timeout and closing the RC connection.

check "ifconfig" for the NIC card, and verify the fields errors, dropped, overruns for both TX and RX

3.2.1.1 Bugs fixed

1. Tx. enqueue error occurs in transmission side.

Fix:
Sysfs entries to select the control method and value for the respective method is added, please refer the document ***LS2_iSSD_RoCE_implementation_user_guide_A0-02.docx(section 8.3.4)***

3.2.1.2 Known issue

1. Out of order packets

Reason:
Multiple Queues in linuxQdisc can cause out of order sending of packets to DPAA transmit (hard transmit func). Receiving side reordering has to be implemented. For back to back connection `tc` command can be used to set one transmit queue which reduces out of order.

2. iSERnoop timeout

Reason:
In file /etc/isci/iscsid.conf , set the below parameters

```
node.conn[0].timeo.noop_out_interval = 120
node.conn[0].timeo.noop_out_timeout = 240
```

which will enable more stable iSER connection, preventing iSER ping timeout which may occur when lot of traffic is going on iSER.

If iscsid is already running before you change the file iscsid.conf
then

1. unmount and logout all iser sessions
2. killalliscsid
3. edit file as mentioned above
4. performdiscovery and login

3.3 NVMe

Known issues and their workarounds are as follows:

3.3.1 Release 1.0

The Inbound and Outbound feature in LS2 is not working with x86 machine. So the NVMe feature cannot be tested now. Fix will be given in next release.

4 Released artifacts

4.1 Release 1.0

```
iSSD_SW_01.01.00
|-- documents
|   |-- LS2085_iNIC_Feature_Test_Guide_A0-00.pdf
|   |-- LS2_iSSDv2.0_Release_notes_V-1.0.pdf
|   |-- LS2_iSSD_RoCE_implementation_and_testing_guide_A0-01.pdf
|   |-- LS2_iSSDv2.0_USER_MANUAL_A0-01.pdf
|
|-- issd-images_01.01.00.tar.gz
|   |-- checksums.md5
|   |-- flash_images.sh
|   `-- images
|       |-- device-tree_01.00.00.dtb
|       |-- dpc_01.00.00.dtb
|       |-- dpl_01.00.00.dtb
|       |-- fpga_01.00.00.rpd
|       |-- mc_01.00.00.itb
|       |-- pbl_01.00.00.bin
|       |-- rootfs_01.01.00.sqsh
|       |-- u-boot_01.01.00.bin
|       |-- uimage_inic_02.01.00.bin
|       `-- uimage_issd_01.01.00.bin
|
|-- issd-sdk_01.01.00.iso
`-- README.txt
```

Note: Please refer user manual "**LS2_iSSDv2.0_USER_MANUAL_A0-01.pdf**" for hardware setup, software setup, flashing binaries into the target board and etc.

5 Documents

File Name	Description
LS2_iSSDv2.0_Release_notes_V-2.2.pdf	Release notes
LS2_iSSDv2.0_USER_MANUAL_A0-01.pdf	User manual for LS2085a iSSD
LS2085_iNIC_Feature_Test_Guide_A0-01.pdf	This document describes the setup and the steps required to validate the Freescale LS2085 card iNIC functionality.
LS2_iSSD_RoCE_implementation_and_testing_guide_A0-03.pdf	This document describes the steps required for establishing and maintaining the RDMA
NVMe_USER_MANUAL_A00-02.pdf	NVMe user manual