extending possibilities

borea

RakunLS1, Qseven SBC module with LS1021A

Software user manual

$HeadURL: https://svn.borea.si/svn/docs/rakun/Docs/RakunLS1_SW_UM.fodt $
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1 GENERAL

1.1 ABOUT THIS DOCUMENT

This document describes software implementation of the RakunLS1 Qseven module.

1.2 REVISION HISTORY

Revision	Date	Notes
1.0	15. October 2015	Initial version

Table 1: Revision history

1.3 ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
SDK	Software Development Kit

Table 2: Acronyms

2 INTRODUCTION

2.1 DEVICE OVERVIEW

RakunLS1 is a Single Board Computer based on Freescale's LS1021A processor, member of the QorIQ Layerscape 1 family. It features up to 5000 CoreMarks of CPU power, 1GB DDR3L memory with ECC, 1GB NAND Flash memory, 32MB qSPI NOR flash, 10/100/1000 Ethernet PHY, 4 6Gb/s SerDes Lanes used for SGMII/PCIe/SATA, PWM channels, CAN bus, UARTs etc.

It is in a Qseven form factor and offers interfaces, used in telecom and industrial applications.

It runs Linux operating system.

3 BUILDING SOFTWARE

3.1 INSTALLING SDK

Download SDK from Freescale WEB side (NOTE: registration requested):

- Linux SDK for LS1021A v0.4: http://www.freescale.com/products/arm-processors/qoriq-arm-processors/qoriq-ls1021a-dual-core-processor-with-lcd-controller:LS1021A?fpsp=1&tab=Design_Tools_Tab

Uncompress download image and mount iso image with sources:

- $ sudo mount -o loop Freescale-Linux-SDK-for-LS1021A-Rev2-v0.4-SOURCE-20150803-yocto.iso /mnt/cdrom

Execute install script from mounted source iso image (non-root user) and enter installation path (ensure that the current user has the correct permission for the install path):

- $ /mnt/cdrom/install

  Where do you want to install SDK? (/home/user) – refered as <yocto_install_path> in the document

Prepare host enviroment:

- $ cd <yocto_install_path>
- $ ./poky/scripts/host-prepare.sh

For additional information refer to QorIQ_SDK_LS1021A_v0.4.pdf.

3.2 ADD SUPPORT FOR RAKUN LS1

To add support for Rakun LS1, patch needs to be applied on the top of QorIQ SDK LS1021A v0.4:

- $ cd <yocto_install_path>
- patch -p1 < <path_to_patch_file>

4 BUILDING SOFTWARE IMAGES

Run setup script to prepare build environment:

- $ cd <yocto_install_path>
- $ source ./poky/fsl-setup-poky -m rakunls1

Start building predefined target image (u-boot, kernel, rootfs):

- $ cd <yocto_install_path>/build_rakunls1_release
- $ bitbake borea-image-networking

To return to this build environment later (or from other terminal) execute:

- source /<yocto_install_path>/build_rakunls1_release/SOURCE_THIS

5 DEPLOY IMAGES TO TARGET

5.1 SD CARD

Images are written to SD card as RAW data (no filesystem used). Card layout:

First block	Number of blocks	Description
0x8	0x7F8	U-Boot
		U-Boot Environment
0x900	0x3000	uImage
0x3900	0x100	uImage DTB
0x5000	0xB000	RAM RootFS

5.1.1 USING TARGET PLATFORM

Deploy new images to SD card with target from U-Boot using TFTP server running in the network (and DHCP server – or upgrade scripts needs to be changed). Copy build images to ftpserver. Files requested (located in <yocto_install_path>/build_rakunls1_release/tmp/deploy/images/rakunls1):

- U-Boot: u-boot-rakunls1.bin
- kernel: uImage-rakunls1.bin
- device tree: uImage-rakunls1.dtb
- RAM RootFS: borea-image-networking-rakunls1.ext2.gz.u-boot

Setup U-Boot environment (type saveenv to store environment):

- setenv tftp_path 192.168.1.2:/tftpserver – update to fit real scenario
- setenv sd_uboot_start_blk 0x8
- setenv sd_uboot_size_blk 0x7F8
- setenv sd_uimage_start_blk 0x900
- setenv sd_uimage_size_blk 0x3000

- setenv sd_dtb_start_blk 0x3900
- setenv sd_dtb_size_blk 0x100
- setenv sd_rootfs_start_blk 0x5000
- setenv sd_rootfs_size_blk 0xB000

Prepare upgrade scripts:

- U-Boot: setenv uboot_upgrade 'dhcp 82000000 $tftp_path/u-boot-rakunls1.bin;mmc write 82000000 $sd_uboot_start_blk $sd_uboot_size_blk'
- kernel: setenv uimage_upgrade 'dhcp 82000000 $tftp_path/uImage-rakunls1.bin;mmc write 82000000 $sd_uimage_start_blk $sd_uimage_size_blk'
- device tree: setenv uimage-dts_upgrade 'dhcp 82000000 $tftp_path/uImage-rakunls1.dtb;mmc write 82000000 $sd_dtb_start_blk $sd_dtb_size_blk'
- root filesystem: setenv rootfs_upgrade 'dhcp 82000000 ${tftp_path}/borea-image-networking-rakunls1.ext2.gz.u-boot;mmc write 82000000 $sd_rootfs_start_blk $sd_rootfs_size_blk'

Execute upgrade commands (NOTE: if not done properly, boot may fail. Use spare SD card.):

- U-Boot: run uboot_upgrade
- kernel: run uimage_upgrade
- device tree: run uimage-dts_upgrade
- root filesystem: run rootfs_upgrade

5.1.2 USING DEVELOPMENT HOST

Deploy images with dd tool.

6 BOOT TARGET

Boot target board with image stored on SD card. U-Boot environment:

- setenv bootargs root=/dev/ram rw ramdisk_size=100144 console=ttyLP0,115200
- setenv firmware_load 'mmc read 82000000 $sd_uimage_start_blk $sd_uimage_size_blk;mmc read 8f000000 $sd_dtb_start_blk $sd_dtb_size_blk;mmc read 84000000 $sd_rootfs_start_blk $sd_rootfs_size_blk'
- setenv bootcmd 'run firmware_load;bootm 82000000 84000000 8f000000'

Save U-Boot environment:

- saveenv

Perform reset or run boot command:

- boot