给大家分享瑞芯微三款 A7 芯片 liteos_a 内核补丁，打上附件补丁编译可进入鸿蒙内核。

补丁主要涉及四个目录：

构建/精简版/

内核/ liteos_a /

驱动程序/ hdf / lite /

供应商/ rockchip /

1.构建/精简版/

该目录修改添加新的产品的编译支持，修改和添加以下文件文件：

```
project build/lite/
 -m          build.py
 --          config/boards/rk3126c.gni
 --          config/boards/rk3288.gni
 --          config/boards/rv1126.gni
 -m          gen_rootfs.py
 --          product/rk3126c.json
 --          product/rk3288.json
 --          product/rv1126.json
```

修改 build.py 和 gen_rootfs.py 两处修改为支持 build.py rk3126c 编译命令和生成 vfat 格式的 rootfs.img。

```
diff --git a/build.py b/build.py
index 003e7e4..76386ce 100755
--- a/build.py
+++ b/build.py
@@ -26,6 +26,9 @@ import os
 def usage():
         msg = "\n    python build.py ipcamera_hi3516dv300\n    "\
```

```
                "python build.py ipcamera_hi3518ev300\n    "\
+               "python build.py rv1126\n    "\
+               "python build.py rk3126c\n    "\
+               "python build.py rk3288\n    "\
                "python build.py wifiiot\n"\
                "\n    Quickstart: https://device.harmonyos.com/cn/docs/start/"\
                "introduce/oem_start_guide-0000001054913231\n"
diff --git a/gen_rootfs.py b/gen_rootfs.py
index ff8d49e..6227435 100755
--- a/gen_rootfs.py
+++ b/gen_rootfs.py
@@ -312,10 +312,7 @@ def main():
            return -1
    if args.board:
-       if args.board == 'hi3516dv300':
-           fstype = 'vfat'
-       else:
-           fstype = 'jffs2'
+       fstype = 'vfat'
    else:
        return -1
```

build / lite / product / rk3126c.json 使用指定的编译 rk3126c 固件包含某些模块，此处删除了基础相关仓库，保留 hdf 驱动以及 liteos_a 内核模块。

```
{
  "ohos_version": "OpenHarmony 1.0",
  "board": "rk3126c",
  "kernel": "liteos_a",
  "compiler": "clang",
  "subsystem": [
    {
      "name": "kernel",
      "component": [
        { "name": "liteos_a", "dir": "//kernel/liteos_a:kernel", "features":[] }
```

```
        ]
      },
      {
        "name": "hdf",
        "component": [
          { "name": "posix", "dir": "//drivers/hdf/lite/posix:hdf_posix",
"features":[] },
          { "name": "manager", "dir": "//drivers/hdf/lite/manager:hdf_manager",
"features":[] }
        ]
      },
      {
        "name": "utils",
        "component": [
          { "name": "kv_store", "dir": "//utils/native/lite/kv_store:kv_store",
"features":[] }
        ]
      }
  ],
  "vendor_adapter_dir": "//vendor/hisi/hi35xx/hi3518ev300/hi3518ev300_adapter",
  "third_party_dir": "//third_party",
  "ohos_product_type":"",
  "ohos_manufacture":"",
  "ohos_brand":"",
  "ohos_market_name":"",
  "ohos_product_series":"",
  "ohos_product_model":"",
  "ohos_software_model":"",
  "ohos_hardware_model":"",
  "ohos_hardware_profile":"",
  "ohos_serial":"",
  "ohos_bootloader_version":"",
  "ohos_secure_patch_level":"",
  "ohos_abi_list":""
```

```
}
```

build / lite / config / boards / rk3126c.gni 指定芯片对应指令集 rk3126c 对应 cortex-a7

```
board_arch = "armv7-a"
board_cpu = "cortex-a7"
```

2.内核/ liteos_a

主要添加芯片对应的内核配置文件如：rk3126c_clang_release.config，添加修改文件如下：

```
project kernel/liteos_a/
 -m        Kconfig
 -m        Makefile
 -m        arch/arm/arm/src/startup/reset_vector_up.S
 -m        fs/vfs/vfs_cmd/vfs_shellcmd.c
 -m        kernel/base/include/los_vm_zone.h
 -m        kernel/base/misc/los_stackinfo.c
 -m        kernel/common/los_config.c
 -m        kernel/common/los_config.h
 -m        kernel/common/los_exc_interaction.c
 -m        kernel/common/los_excinfo.c
 -m        kernel/common/los_rootfs.c
 -m        kernel/extended/trace/los_trace.c
 -m        platform/Kconfig
 -m        platform/Makefile
 -m        platform/bsp.mk
 -m        shell/full/src/base/shcmd.c
 -m        shell/full/src/base/shmsg.c
 -m        shell/full/src/base/show.c
 -m        shell/full/src/cmds/dmesg.c
 --       tools/build/config/debug/rv1126.config
 --       tools/build/config/debug/rv1126_clang.config
 --       tools/build/config/rk3126c_clang_release.config
```

```
--        tools/build/config/rk3288_clang_release.config
--        tools/build/config/rv1126_clang_release.config
-m         tools/build/mk/los_config.mk
```

添加编译内核的配置文件 tools / build / config / rk3126c_clang_release.config，添加宏 LOSCFG_PLATFORM_RK3126C = y 和 LOSCFG_PLATFORM =“ rk3126c”支持区分新的芯片编译

```
#
# Automatically generated file; DO NOT EDIT.
# Huawei LiteOS Configuration
#
#
# Compiler
#
# LOSCFG_COMPILER_HIMIX_32 is not set
LOSCFG_COMPILER_CLANG_LLVM=y
#
# Platform
#
LOSCFG_PLATFORM="rk3126c"
# LOSCFG_PLATFORM_HI3516DV300 is not set
# LOSCFG_PLATFORM_HI3518EV300 is not set
# LOSCFG_PLATFORM_RV1126 is not set
LOSCFG_PLATFORM_RK3126C=y
# LOSCFG_PLATFORM_RK3288 is not set
LOSCFG_PLATFORM_BSP_GIC_V2=y
LOSCFG_ARCH_ARM=y
LOSCFG_ARCH_ARM_AARCH32=y
LOSCFG_ARCH_ARM_V7A=y
LOSCFG_ARCH_ARM_VER="armv7-a"
LOSCFG_ARCH_FPU_VFP_V4=y
LOSCFG_ARCH_FPU_VFP_D32=y
LOSCFG_ARCH_FPU_VFP_NEON=y
```

```
LOSCFG_ARCH_FPU="neon-vfpv4"
LOSCFG_ARCH_CORTEX_A7=y
LOSCFG_ARCH_CPU="cortex-a7"
#
# Extra Configurations
#
# LOSCFG_ARCH_FPU_DISABLE is not set
LOSCFG_IRQ_USE_STANDALONE_STACK=y
LOSCFG_PLATFORM_ROOTFS=y
#
# Kernel
#
# LOSCFG_KERNEL_SMP is not set
LOSCFG_KERNEL_EXTKERNEL=y
LOSCFG_KERNEL_CPPSUPPORT=y
LOSCFG_KERNEL_CPUP=y
LOSCFG_CPUP_INCLUDE_IRQ=y
LOSCFG_KERNEL_DYNLOAD=y
LOSCFG_KERNEL_VDSO=y
# LOSCFG_KERNEL_TICKLESS is not set
LOSCFG_KERNEL_TRACE=y
LOSCFG_KERNEL_LITEIPC=y
LOSCFG_KERNEL_PIPE=y
LOSCFG_BASE_CORE_HILOG=y
#
# Lib
#
LOSCFG_LIB_LIBC=y
LOSCFG_LIB_ZLIB=y
#
# Compat
#
LOSCFG_COMPAT_POSIX=y
```

```
LOSCFG_COMPAT_BSD=y
#
# FileSystem
#
LOSCFG_FS_VFS=y
LOSCFG_FS_VFS_BLOCK_DEVICE=y
LOSCFG_FILE_MODE=y
LOSCFG_FS_FAT=y
LOSCFG_FS_FAT_CACHE=y
LOSCFG_FS_FAT_CACHE_SYNC_THREAD=y
LOSCFG_FS_FAT_CHINESE=y
LOSCFG_FS_FAT_VIRTUAL_PARTITION=y
LOSCFG_FS_FAT_VOLUMES=16
LOSCFG_FS_FAT_DISK=y
LOSCFG_FS_RAMFS=y
LOSCFG_FS_NFS=y
LOSCFG_FS_PROC=y
# LOSCFG_FS_JFFS is not set
#
# Net
#
LOSCFG_NET_LWIP_SACK=y
LOSCFG_NET_LWIP_SACK_2_1=y
#
# Debug
#
# LOSCFG_COMPILE_DEBUG is not set
LOSCFG_PLATFORM_ADAPT=y
LOSCFG_ENABLE_OOM_LOOP_TASK=y
LOSCFG_ENABLE_MAGICKEY=y
# LOSCFG_THUMB is not set
LOSCFG_DEBUG_VERSION=y
LOSCFG_DEBUG_KERNEL=y
```

```
LOSCFG_DEBUG_QUEUE=y
LOSCFG_DEBUG_DEADLOCK=y
LOSCFG_DEBUG_SEMAPHORE=y
LOSCFG_SHELL=y
#
# Functionality of Shell
#
LOSCFG_SHELL_LK=y
# LOSCFG_SHELL_DMESG is not set
# LOSCFG_SHELL_EXCINFO is not set
# LOSCFG_NET_LWIP_SACK_TFTP is not set
# LOSCFG_NET_TELNET is not set
# LOSCFG_EXC_INTERACTION is not set
LOSCFG_USER_INIT_DEBUG=y
LOSCFG_SHELL_CMD_DEBUG=y
# LOSCFG_MEM_DEBUG is not set
LOSCFG_PLATFORM_UART_WITHOUT_VFS=y
# LOSCFG_PLATFORM_NO_UART is not set
#
# Driver
#
LOSCFG_DRIVERS=y
# LOSCFG_DRIVERS_USB is not set
LOSCFG_DRIVERS_HDF=y
LOSCFG_DRIVERS_HDF_PLATFORM=y
LOSCFG_DRIVERS_HDF_PLATFORM_I2C=y
# LOSCFG_DRIVERS_HDF_PLATFORM_SPI is not set
# LOSCFG_DRIVERS_HDF_PLATFORM_GPIO is not set
# LOSCFG_DRIVERS_HDF_PLATFORM_WATCHDOG is not set
# LOSCFG_DRIVERS_HDF_PLATFORM_SDIO is not set
# LOSCFG_DRIVERS_HDF_PLATFORM_RTC is not set
# LOSCFG_DRIVERS_HDF_PLATFORM_HISI_SDK is not set
# LOSCFG_DRIVERS_HDF_WIFI is not set
```

```
# LOSCFG_DRIVERS_HDF_INPUT is not set
# LOSCFG_DRIVERS_HDF_LCD is not set
# LOSCFG_DRIVERS_HDF_USB is not set
# LOSCFG_DRIVERS_NETDEV is not set
LOSCFG_DRIVERS_MEM=y
# LOSCFG_DRIVERS_MTD is not set
# LOSCFG_DRIVERS_RANDOM is not set
LOSCFG_DRIVERS_VIDEO=y
LOSCFG_DRIVERS_HIEVENT=y
#
# Security
#
LOSCFG_SECURITY=y
LOSCFG_SECURITY_CAPABILITY=y
LOSCFG_SECURITY_VID=y
# LOSCFG_SECURITY_BOOT is not set
#
# Stack Smashing Protector (SSP) Compiler Feature
#
# LOSCFG_CC_NO_STACKPROTECTOR is not set
# LOSCFG_CC_STACKPROTECTOR is not set
LOSCFG_CC_STACKPROTECTOR_STRONG=y
# LOSCFG_CC_STACKPROTECTOR_ALL is not set
```

内核/ liteos_a / Kconfig

添加 LOSCFG_PLATFORM_RK3126C 宏判断，指定 rk3126c 支持“ clang-llvm”

编译器，并注释屏蔽海思芯片相关的 Kconfig

```
diff --git a/Kconfig b/Kconfig
index 522800b..4e0f99f 100755
--- a/Kconfig
+++ b/Kconfig
@@ -42,11 +42,11 @@ choice
```

```
 config COMPILER_HIMIX_32
        bool "arm-linux-ohoseabi"
-       depends on PLATFORM_HI3518EV300 || PLATFORM_HI3516DV300
+       depends on PLATFORM_HI3518EV300 || PLATFORM_HI3516DV300 ||
PLATFORM_RV1126 || PLATFORM_RK3126C || PLATFORM_RK3288

 config COMPILER_CLANG_LLVM
        bool "clang-llvm"
-              depends on PLATFORM_HI3518EV300 || PLATFORM_HI3516DV300
+              depends on PLATFORM_HI3518EV300 || PLATFORM_HI3516DV300 ||
PLATFORM_RV1126 || PLATFORM_RK3126C || PLATFORM_RK3288

 endchoice
 endmenu
@@ -274,7 +274,7 @@ config VM_OVERLAP_CHECK
 config NULL_ADDRESS_PROTECT
        bool "Enable NULL Address protect"
        default n
-       depends on (PLATFORM_HI3518EV200 || PLATFORM_HI3516CV300 ||
PLATFORM_HI3518EV300 || PLATFORM_HI3516DV300) &&
DEBUG_VERSION
+       depends on (PLATFORM_HI3518EV200 || PLATFORM_HI3516CV300 ||
PLATFORM_HI3518EV300 || PLATFORM_HI3516DV300 || PLATFORM_RV1126)
&& DEBUG_VERSION
        help
          Answer Y to set mem address 0~1M prohibit to access, read or write will
trigger exception.

@@ -284,7 +284,7 @@ choice
        help
          Enable simple uart (without vfs) only for litekernel.
          Enable general uart (with vfs) for full code.
-source "../../vendor/hisi/hi35xx/platform/uart/Kconfig"
+##source "../../vendor/hisi/hi35xx/platform/uart/Kconfig"
 config PLATFORM_UART_WITHOUT_VFS
```

```
        bool "Simple Uart"
 config PLATFORM_NO_UART
@@ -301,7 +301,7 @@ config DRIVERS
        help
            Answer Y to enable LiteOS support driver.

-source "../../vendor/hisi/hi35xx/platform/hiedmac/Kconfig"
+#source "../../vendor/hisi/hi35xx/platform/hiedmac/Kconfig"
 source "../../kernel/liteos_a/bsd/dev/usb/Kconfig"
 source "../../drivers/hdf/lite/Kconfig"

@@ -319,11 +319,11 @@ choice
        help
            Enable higmac for hi3516a hi3519 hi3559a_cortex-a53_aarch64.
            Enable hieth-sf for hi3516cv300 hi3516ev200 and hi3518ev200.
-source "../../vendor/hisi/hi35xx/platform/hieth-sf/Kconfig"
+#source "../../vendor/hisi/hi35xx/platform/hieth-sf/Kconfig"
 endchoice

 source "../../drivers/liteos/mem/Kconfig"
-source "../../vendor/hisi/hi35xx/platform/mmc/Kconfig"
+#source "../../vendor/hisi/hi35xx/platform/mmc/Kconfig"


 config DRIVERS_MTD
@@ -333,7 +333,7 @@ config DRIVERS_MTD
        help
            Answer Y to enable LiteOS support jffs2 multipartion.

-source "../../vendor/hisi/hi35xx/platform/mtd/spi_nor/Kconfig"
+#source "../../vendor/hisi/hi35xx/platform/mtd/spi_nor/Kconfig"
 source "../../drivers/liteos/random/Kconfig"
 source "../../drivers/liteos/tzdriver/Kconfig"
```

```
source "../../drivers/liteos/video/Kconfig"
```

kernel / liteos_a / Makefile 修改 Makefile，指定 FSTYPE = vfat 执行 make rootfs 时编译编译 vfat 格式 root.img，指定 rk3126c 和其他芯片所包含的 BOARD_INCLUDE_DIR 目录

```
--- a/Makefile
+++ b/Makefile
@@ -59,6 +59,16 @@ endif
 ifeq ($(LOSCFG_PLATFORM_HI3516DV300), y)
 FSTYPE = vfat
 endif
+ifeq ($(LOSCFG_PLATFORM_RV1126), y)
+FSTYPE = vfat
+endif
+ifeq ($(LOSCFG_PLATFORM_RK3126C), y)
+FSTYPE = vfat
+endif
+ifeq ($(LOSCFG_PLATFORM_RK3288), y)
+FSTYPE = vfat
+endif
+
 ROOTFS_DIR = $(OUT)/rootfs
 ROOTFS_ZIP = $(OUT)/rootfs.zip
 VERSION =
@@ -101,9 +111,19 @@ endif
 ##### make lib #####
 $(__LIBS): $(OUT) $(CXX_INCLUDE)
+ifeq ($(LOSCFG_PLATFORM_RV1126), y)
+BOARD_INCLUDE_DIR := $(LITEOSTOPDIR)/../../vendor/rockchip/rv1126/board
+else ifeq ($(LOSCFG_PLATFORM_RK3126C), y)
+BOARD_INCLUDE_DIR := $(LITEOSTOPDIR)/../../vendor/rockchip/rk3126c/board
```

```
+else ifeq ($(LOSCFG_PLATFORM_RK3288), y)
+BOARD_INCLUDE_DIR :=
$(LITEOSTOPDIR)/../../vendor/rockchip/rk3288/board
+else
+BOARD_INCLUDE_DIR :=
$(LITEOSTOPDIR)/../../vendor/hisi/hi35xx/$(LITEOS_PLATFORM)/config/board
+endif
+
 $(OUT): $(LITEOS_MENUCONFIG_H)
            $(HIDE)mkdir -p $(OUT)/lib
-           $(HIDE)$(CC) -I$(LITEOS_PLATFORM_BASE)/include
-I$(LITEOSTOPDIR)/../../vendor/hisi/hi35xx/$(LITEOS_PLATFORM)/config/board
\
+           $(HIDE)$(CC) -I$(LITEOS_PLATFORM_BASE)/include
-I$(BOARD_INCLUDE_DIR) \
                        -E $(LITEOS_PLATFORM_BASE)/board.ld.S \
                        -o $(LITEOS_PLATFORM_BASE)/board.ld -P
```

platform 目录修改：关联板平台添加 rk3126c 所需要编译的定时器，以及包括目录

```
diff --git a/platform/Kconfig b/platform/Kconfig
index 2b34a8d..3deefbc 100755
--- a/platform/Kconfig
+++ b/platform/Kconfig
@@ -2,6 +2,9 @@ config PLATFORM
        string
        default "hi3516dv300"         if PLATFORM_HI3516DV300
        default "hi3518ev300"         if PLATFORM_HI3518EV300
+       default "rv1126"              if PLATFORM_RV1126
+       default "rk3126c"             if PLATFORM_RK3126C
+       default "rk3288"              if PLATFORM_RK3288

 choice
        prompt "Board"
```

```
@@ -19,6 +22,18 @@ config PLATFORM_HI3518EV300
        bool "hi3518ev300"
        select ARCH_CORTEX_A7

+config PLATFORM_RV1126
+       bool "rv1126"
+       select ARCH_CORTEX_A7
+
+config PLATFORM_RK3126C
+       bool "rk3126c"
+       select ARCH_CORTEX_A7
+
+config PLATFORM_RK3288
+       bool "rk3288"
+       select ARCH_CORTEX_A7
+
 endchoice

 config TEE_ENABLE
diff --git a/platform/Makefile b/platform/Makefile
index e7ced6b..5101bfc 100755
--- a/platform/Makefile
+++ b/platform/Makefile
@@ -40,7 +40,7 @@ LOCAL_SRCS = $(wildcard $(HWI_SRC)/*.c) \
 LOCAL_INCLUDE += -I $(LITEOSTOPDIR)/compat/posix/src \
                  -I $(LITEOSTOPDIR)/bsd/dev/random

-ifeq ($(findstring y, $(LOSCFG_PLATFORM_HI3518EV300)$(LOSCFG_PLATFORM_HI3516DV300)), y)
+ifeq ($(findstring y, $(LOSCFG_PLATFORM_HI3518EV300)$(LOSCFG_PLATFORM_HI3516DV300)$(LOSCFG_PLATFORM_RV1126)$(LOSCFG_PLATFORM_RK3126C))$(LOSCFG_PLATFORM_RK3288), y)
 LOCAL_SRCS += $(wildcard ../kernel/common/*.c)
```

```
 LOCAL_SRCS := $(filter-out ../kernel/common/los_rootfs.c, $(LOCAL_SRCS))
 ifneq ($(LOSCFG_FS_VFS), y)
diff --git a/platform/bsp.mk b/platform/bsp.mk
index 7714dbf..07f71ba 100755
--- a/platform/bsp.mk
+++ b/platform/bsp.mk
@@ -55,7 +55,15 @@ else ifeq ($(LOSCFG_PLATFORM_HI3518EV300), y)
        UART_TYPE       := amba_pl011
        USB_TYPE        := usb3.0_hi3518ev300
        LITEOS_CMACRO_TEST += -DTEST3518EV300
-
+else ifeq ($(LOSCFG_PLATFORM_RV1126), y)
+       HWI_TYPE        := arm/interrupt/gic
+       TIMER_TYPE      := arm/timer/arm_generic
+else ifeq ($(LOSCFG_PLATFORM_RK3126C), y)
+       HWI_TYPE        := arm/interrupt/gic
+       TIMER_TYPE      := arm/timer/arm_generic
+else ifeq ($(LOSCFG_PLATFORM_RK3288), y)
+       HWI_TYPE        := arm/interrupt/gic
+       TIMER_TYPE      := arm/timer/arm_generic
 endif

 HWI_SRC         := hw/$(HWI_TYPE)
@@ -80,7 +88,14 @@ PLATFORM_INCLUDE := -I
$(LITEOSTOPDIR)/../../vendor/hisi/hi35xx/$(LITEOS_PLATFOR

 ifeq ($(findstring y,
$(LOSCFG_PLATFORM_HI3518EV300)$(LOSCFG_PLATFORM_HI3516DV300))
, y)
        PLATFORM_INCLUDE += -I
$(LITEOSTOPDIR)/../../vendor/hisi/hi35xx/$(LITEOS_PLATFORM)/config/board/i
nclude/hisoc
+else ifeq ($(LOSCFG_PLATFORM_RV1126),y)
+       PLATFORM_INCLUDE += -I
$(LITEOSTOPDIR)/../../vendor/rockchip/rv1126/board/include
```

```
+else ifeq ($(LOSCFG_PLATFORM_RK3126C),y)
+       PLATFORM_INCLUDE += -I
$(LITEOSTOPDIR)/../../vendor/rockchip/rk3126c/board/include
+else ifeq ($(LOSCFG_PLATFORM_RK3288),y)
+       PLATFORM_INCLUDE += -I
$(LITEOSTOPDIR)/../../vendor/rockchip/rk3288/board/include
 endif
+
 #
 #-include
$(LITEOSTOPDIR)/platform/bsp/board/$(LITEOS_PLATFORM)/board.mk
 #
```

kernel / liteos_a / arch / arm / arm / src / startup / reset_vector_up，添加 uart 打印显示调试信息，注释启用 fpu + neon 的指令// MCR p15，0，r0，c1，c1，2，不注释会卡在这。

```
diff --git a/arch/arm/arm/src/startup/reset_vector_up
b/arch/arm/arm/src/startup/reset_vector_up
index d7de477..8cddab8 100755
--- a/arch/arm/arm/src/startup/reset_vector_up.S
+++ b/arch/arm/arm/src/startup/reset_vector_up.S
@@ -113,11 +113,36 @@ __exception_handlers:
        .global reset_vector
        .type      reset_vector,function
 reset_vector:
+       ldr sp,=0x75000000
+
+#if 0
        /* do some early cpu setup: i/d cache disable, mmu disabled */
        mrc         p15, 0, r0, c1, c0, 0
        bic         r0, #(1<<12)
        bic         r0, #(1<<2 | 1<<0)
        mcr         p15, 0, r0, c1, c0, 0
+#endif
```

```
+
+#if 0
+        /*
+         * disable interrupts (FIQ and IRQ), also set the cpu to SVC32 mode,
+         * except if in HYP mode already
+         */
+        mrs     r0, cpsr
+        and     r1, r0, #0x1f           @ mask mode bits
+        teq     r1, #0x1a               @ test for HYP mode
+        bicne   r0, r0, #0x1f           @ clear all mode bits
+        orrne   r0, r0, #0x13           @ set SVC mode
+        orr     r0, r0, #0xc0           @ disable FIQ and IRQ
+        msr     cpsr,r0
+
+        /*
+         * If I-cache is enabled invalidate it
+         */
+        mcr     p15, 0, r0, c7, c5, 0           @ invalidate icache
+        mcr     p15, 0, r0, c7, c10, 4          @ DSB
+        mcr     p15, 0, r0, c7, c5, 4           @ ISB
+#endif

        /* r11: delta of physical address and virtual address */
        adr     r11, pa_va_offset
@@ -150,8 +175,11 @@ reloc_img_to_bottom_done:
        add     r4, r4, r11
        bl      page_table_clear

-       PAGE_TABLE_SET SYS_MEM_BASE, KERNEL_VMM_BASE,
KERNEL_VMM_SIZE, MMU_DESCRIPTOR_KERNEL_L1_PTE_FLAGS
+
+
       PAGE_TABLE_SET SYS_MEM_BASE, UNCACHED_VMM_BASE,
UNCACHED_VMM_SIZE, MMU_INITIAL_MAP_STRONGLY_ORDERED
```

```
+       PAGE_TABLE_SET DDR_RAMFS_ADDR, DDR_RAMFS_VBASE,
DDR_RAMFS_SIZE, MMU_INITIAL_MAP_DEVICE
+       PAGE_TABLE_SET SYS_MEM_BASE, KERNEL_VMM_BASE,
KERNEL_VMM_SIZE, MMU_DESCRIPTOR_KERNEL_L1_PTE_FLAGS
        PAGE_TABLE_SET PERIPH_PMM_BASE, PERIPH_DEVICE_BASE,
PERIPH_DEVICE_SIZE, MMU_INITIAL_MAP_DEVICE
        PAGE_TABLE_SET PERIPH_PMM_BASE, PERIPH_CACHED_BASE,
PERIPH_CACHED_SIZE, MMU_DESCRIPTOR_KERNEL_L1_PTE_FLAGS
        PAGE_TABLE_SET PERIPH_PMM_BASE, PERIPH_UNCACHED_BASE,
PERIPH_UNCACHED_SIZE, MMU_INITIAL_MAP_STRONGLY_ORDERED
@@ -173,8 +201,12 @@ reloc_img_to_bottom_done:
        rsb         r7, r11, r6, lsl #20                    /* r7: va */
        str         r12, [r4, r7, lsr #(20 - 2)]            /* jumpTable[vaIndex] = pt entry */

+       mov r0,#'V'
+       bl uart_imp_putc_phy
        bl          mmu_setup                               /* set up the mmu */

+       mov r0,#'C'
+       bl uart_imp_putc
        /* get cpuid and keep it in r11 */
        mrc         p15, 0, r11, c0, c0, 5
        and         r11, r11, #MPIDR_CPUID_MASK
@@ -196,6 +228,8 @@ excstatck_loop:

 excstatck_loop_done:
 warm_reset:
+mov r0,#'D'
+       bl uart_imp_putc
        /* initialize interrupt/exception environments */
        mov       r0, #(CPSR_IRQ_DISABLE
|CPSR_FIQ_DISABLE|CPSR_IRQ_MODE)
        msr       cpsr, r0
@@ -219,20 +253,23 @@ warm_reset:
```

```
        /* Note: some functions in LIBGCC1 will cause a "restore from SPSR"!! */
        msr       spsr, r0
-
+mov r0,#'E'
+       bl uart_imp_putc
        /* set svc stack, every cpu has OS_EXC_SVC_STACK_SIZE stack */
        ldr       r0, =__svc_stack_top
        mov       r2, #OS_EXC_SVC_STACK_SIZE
        mul       r2, r2, r11
        sub       r0, r0, r2
        mov       sp, r0
-
+mov r0,#'F'
+       bl uart_imp_putc
        /* enable fpu+neon */
        MRC       p15, 0, r0, c1, c1, 2
        ORR       r0, r0, #0xC00
        BIC       r0, r0, #0xC000
-       MCR       p15, 0, r0, c1, c1, 2
-
+       //MCR       p15, 0, r0, c1, c1, 2
+mov r0,#'G'
+       bl uart_imp_putc
        LDR       r0, =(0xF << 20)
        MCR       p15, 0, r0, c1, c0, 2


@@ -266,7 +303,8 @@ bss_loop:
        bl        GDB_START
        .word     0xe7ffdeff
 #endif
-
+mov r0,#'M'
+       bl uart_imp_putc
```

```
        bl        main


 _start_hang:
```

3.drivers / hdf / lite

修改 hdf_driver.mk 根据芯片选择编译的 hdf 脚本 vendor / rockchip / hdf / hdf_vendor.mk

```
diff --git a/Makefile b/Makefile
index 635e1fe..8db4e6c 100755
--- a/Makefile
+++ b/Makefile
@@ -94,6 +94,6 @@ ifeq ($(LOSCFG_DRIVERS_HDF_WIFI), y)
                        LOCAL_SRCS +=
$(HDF_ADAPTER)/network/src/net_device_adapter.c
 endif
-LOCAL_FLAGS += $(LITEOS_GCOV_OPTS)
+LOCAL_FLAGS += $(LITEOS_GCOV_OPTS) -Wno-error
 include $(HDF_DRIVER)
diff --git a/hdf_driver.mk b/hdf_driver.mk
index 469387e..8710688 100755
--- a/hdf_driver.mk
+++ b/hdf_driver.mk
@@ -20,8 +20,12 @@ HCGEN_PATH := win-x86/bin/hc-gen.exe
 endif
 ifeq ($(LOCAL_HCS_ROOT),)
+ifeq ($(findstring y,
$(LOSCFG_PLATFORM_RV1126)$(LOSCFG_PLATFORM_RK3126C)$(LOSCF
G_PLATFORM_RK3288)), y)
+LOCAL_HCS_ROOT := vendor/rockchip
+else
 LOCAL_HCS_ROOT := vendor/hisi/hi35xx
 endif
+endif
 HC_GEN := hc-gen
```

```
 BUILD_IN_HC_GEN :=
$(LITEOSTOPDIR)/../../prebuilts/build-tools/$(HCGEN_PATH)
diff --git a/hdf_lite.mk b/hdf_lite.mk
index d6d21d7..46d7940 100755
--- a/hdf_lite.mk
+++ b/hdf_lite.mk
@@ -36,7 +36,13 @@ ifeq ($(LOSCFG_DRIVERS_HDF_USB), y)
 endif
 # vendor lib
+ifeq ($(findstring y,
$(LOSCFG_PLATFORM_HI3518EV300)$(LOSCFG_PLATFORM_HI3516DV300))
, y)
 include $(LITEOSTOPDIR)/../../vendor/huawei/hdf/hdf_vendor.mk
+endif
+
+ifeq ($(findstring y,
$(LOSCFG_PLATFORM_RV1126)$(LOSCFG_PLATFORM_RK3126C)$(LOSCF
G_PLATFORM_RK3288)), y)
+include $(LITEOSTOPDIR)/../../vendor/rockchip/hdf/hdf_vendor.mk
+endif
     LITEOS_BASELIB += --no-whole-archive
 endif
```

4.供应商/芯片

添加 rockchip 和 rk3126c，rk3288，rv1126 子目录存放芯片差异相关的 board.c 和配置文件

```
 rk3288/board/Makefile                                |   9 +
 rk3288/board/board.c                                 | 109 +++++
 rk3288/board/bsd_board.c                             |  82 ++++
 rk3288/board/include/asm/hal_platform_ints.h | 115 +++++
 rk3288/board/include/asm/platform.h                  | 149 +++++++
 rk3288/board/include/board.h                         |  53 +++
 rk3288/board/include/clock.h                         |  42 ++
 rk3288/board/include/platform_config.h               |  37 ++
```

```
rk3288/board/include/reset_shell.h                 |   48 ++
rk3288/board/include/spinor.h                      |  121 +++++
rk3288/board/include/uart.h                        |  129 ++++++
rk3288/config/Makefile                             |    9 +
rk3288/config/device_info/device_info.hcs          |   27 ++
rk3288/config/hdf.hcs                              |    6 +
rk3288/config/i2c/i2c_config.hcs                   |   21 +
rk3288/driver/ramdisk/Makefile                     |    7 +
rk3288/driver/ramdisk/ramdisk.c                    |  137 ++++++
rk3288/driver/rv1126-fb/Makefile                   |    7 +
rk3288/driver/rv1126-fb/imx6ull_lcd.c              |   85 ++++
rk3288/driver/rv1126-fb/imx6ull_lcd.h              |   58 +++
rk3288/driver/rv1126-fb/imx6ull_lcdc.c             | 581
++++++++++++++++++++++++
rk3288/driver/rv1126-fb/imx6ull_lcdc.h             | 313 ++++++++++++++
rk3288/driver/rv1126-i2c/Makefile                  |   19 +
rk3288/driver/rv1126-i2c/i2c_dev.c                 | 466 ++++++++++++++++++++
rk3288/driver/rv1126-i2c/i2c_dev.h                 |   58 +++
rk3288/driver/rv1126-i2c/i2c_imx6ull.c             | 634
++++++++++++++++++++++++++
rk3288/driver/rv1126-uart/Makefile                 |    8 +
rk3288/driver/rv1126-uart/uart_core.c              | 158 +++++++
rk3288/driver/rv1126-uart/uart_dev.c               | 364 ++++++++++++++++
rk3288/driver/rv1126-uart/uart_dev.h               | 245 ++++++++++
rk3288/driver/rv1126-uart/uart_rv1126.c            | 441 ++++++++++++++++++++
rk3288/driver/rv1126-uart/uart_rv1126.h            | 272 ++++++++++++
rk3288/rk3288.mk                                   |   16 +
rk3126c/board/include/asm/hal_platform_ints.h      |    6 +++---
rk3126c/board/include/asm/platform.h               |   16 ++++++++--------
rk3126c/board/include/board.h                      |    6 +++---
rk3126c/driver/rv1126-uart/uart_rv1126.c           |    4 ++--
rk3126c/rk3126c.mk                                 |    2 +-
hdf/hdf_vendor.mk                                  |   32 ++
rk3126c/board/Makefile                             |    9 +
```

```
rk3126c/board/board.c                                  | 109 +++++
rk3126c/board/bsd_board.c                              |  82 ++++
rk3126c/board/include/asm/hal_platform_ints.h | 115 +++++
rk3126c/board/include/asm/platform.h                   | 149 ++++++
rk3126c/board/include/board.h                          |  53 +++
rk3126c/board/include/clock.h                          |  42 ++
rk3126c/board/include/platform_config.h                |  37 ++
rk3126c/board/include/reset_shell.h                    |  48 ++
rk3126c/board/include/spinor.h                         | 121 +++++
rk3126c/board/include/uart.h                           | 129 ++++++
rk3126c/config/Makefile                                |   9 +
rk3126c/config/device_info/device_info.hcs             |  27 ++
rk3126c/config/hdf.hcs                                 |   6 +
rk3126c/config/i2c/i2c_config.hcs                      |  21 +
rk3126c/driver/ramdisk/Makefile                        |   7 +
rk3126c/driver/ramdisk/ramdisk.c                       | 137 ++++++
rk3126c/driver/rv1126-fb/Makefile                      |   7 +
rk3126c/driver/rv1126-fb/imx6ull_lcd.c                 |  85 ++++
rk3126c/driver/rv1126-fb/imx6ull_lcd.h                 |  58 +++
rk3126c/driver/rv1126-fb/imx6ull_lcdc.c                | 581
++++++++++++++++++++++
rk3126c/driver/rv1126-fb/imx6ull_lcdc.h                | 313 ++++++++++++++
rk3126c/driver/rv1126-i2c/Makefile                     |  19 +
rk3126c/driver/rv1126-i2c/i2c_dev.c                    | 466 ++++++++++++++++++++
rk3126c/driver/rv1126-i2c/i2c_dev.h                    |  58 +++
rk3126c/driver/rv1126-i2c/i2c_imx6ull.c                | 634
++++++++++++++++++++++++++
rk3126c/driver/rv1126-uart/Makefile                    |   8 +
rk3126c/driver/rv1126-uart/uart_core.c                 | 158 +++++++
rk3126c/driver/rv1126-uart/uart_dev.c                  | 364 +++++++++++++++
rk3126c/driver/rv1126-uart/uart_dev.h                  | 245 ++++++++++
rk3126c/driver/rv1126-uart/uart_rv1126.c               | 441 ++++++++++++++++++
rk3126c/driver/rv1126-uart/uart_rv1126.h               | 272 ++++++++++++
rk3126c/rk3126c.mk                                     |  16 +
```

```
rv1126/board/Makefile                          |   9 +
rv1126/board/board.c                           | 109 +++++
rv1126/board/bsd_board.c                       |  82 ++++
rv1126/board/include/asm/hal_platform_ints.h   | 115 +++++
rv1126/board/include/asm/platform.h            | 149 ++++++
rv1126/board/include/board.h                   |  53 +++
rv1126/board/include/clock.h                   |  42 ++
rv1126/board/include/platform_config.h         |  37 ++
rv1126/board/include/reset_shell.h             |  48 ++
rv1126/board/include/spinor.h                  | 121 +++++
rv1126/board/include/uart.h                    | 129 ++++++
rv1126/config/Makefile                         |   9 +
rv1126/config/device_info/device_info.hcs      |  27 ++
rv1126/config/hdf.hcs                          |   6 +
rv1126/config/i2c/i2c_config.hcs               |  21 +
rv1126/driver/ramdisk/Makefile                 |   7 +
rv1126/driver/ramdisk/ramdisk.c                | 137 ++++++
rv1126/driver/rv1126-fb/Makefile               |   7 +
rv1126/driver/rv1126-fb/imx6ull_lcd.c          |  85 ++++
rv1126/driver/rv1126-fb/imx6ull_lcd.h          |  58 +++
rv1126/driver/rv1126-fb/imx6ull_lcdc.c         | 581
++++++++++++++++++++++
rv1126/driver/rv1126-fb/imx6ull_lcdc.h         | 313 ++++++++++++++
rv1126/driver/rv1126-i2c/Makefile              |  19 +
rv1126/driver/rv1126-i2c/i2c_dev.c             | 466 ++++++++++++++++++++
rv1126/driver/rv1126-i2c/i2c_dev.h             |  58 +++
rv1126/driver/rv1126-i2c/i2c_imx6ull.c         | 634
++++++++++++++++++++++++++
rv1126/driver/rv1126-uart/Makefile             |   8 +
rv1126/driver/rv1126-uart/uart_core.c          | 158 +++++++
rv1126/driver/rv1126-uart/uart_dev.c           | 364 ++++++++++++++++
rv1126/driver/rv1126-uart/uart_dev.h           | 245 +++++++++++
rv1126/driver/rv1126-uart/uart_rv1126.c        | 441 ++++++++++++++++++
rv1126/driver/rv1126-uart/uart_rv1126.h        | 272 ++++++++++++
```

rv1126/rv1126.mk | 16 +

补丁打完后可通过build.py进行编译

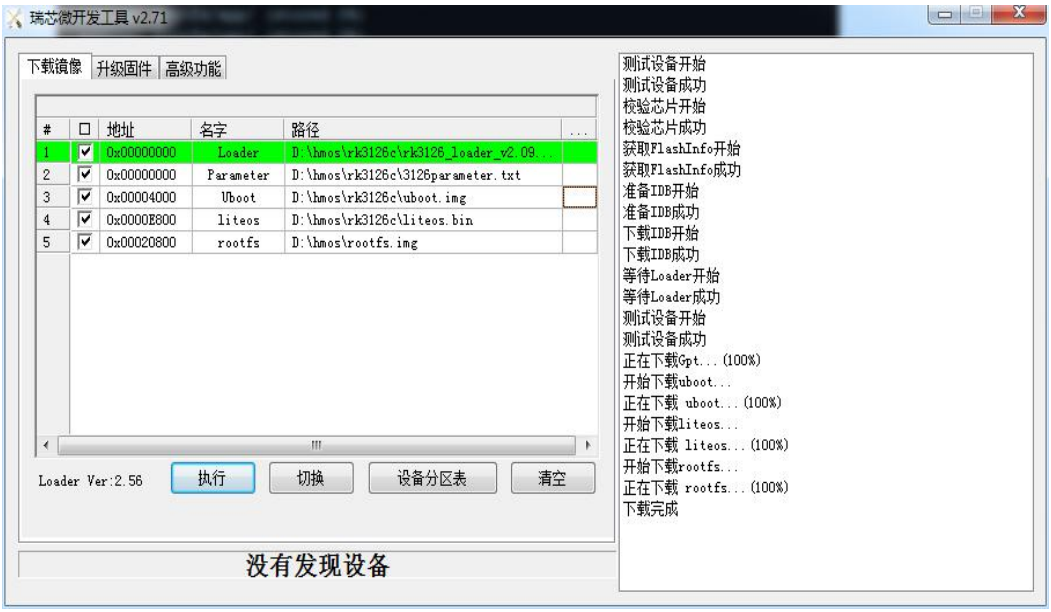
```
usage:
  python build.py ipcamera_hi3516dv300
  python build.py ipcamera_hi3518ev300
  python build.py rv1126
  python build.py rk3126c
  python build.py rk3288
  python build.py wifiiot
```

build.py rk3126c

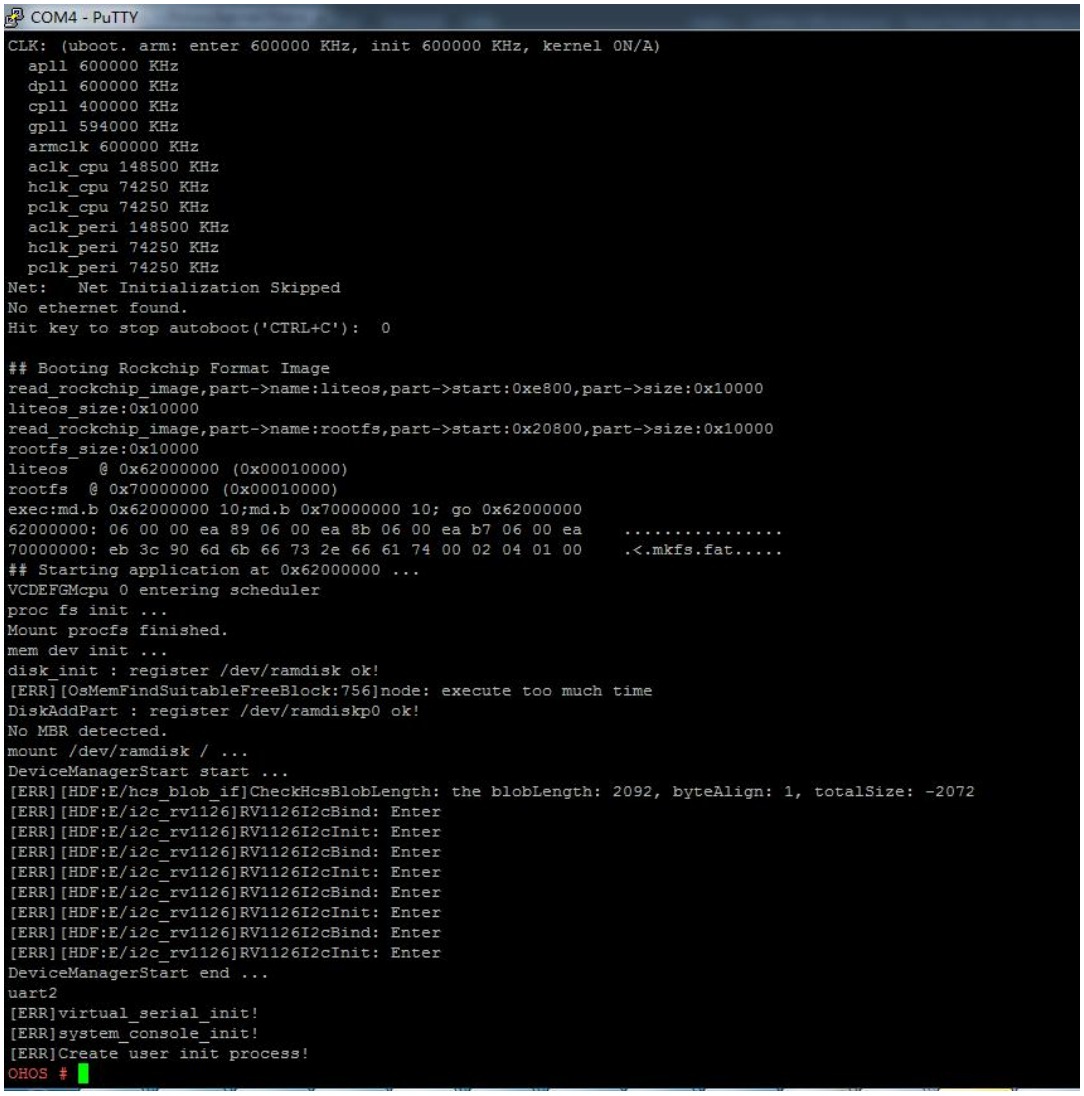
```
2317312 bytes (2.3 MB, 2.2 MiB) copied, 0.0103798 s, 223 MB/s
  adding: rootfs/ (stored 0%)
  adding: rootfs/lib/ (stored 0%)
  adding: rootfs/lib/libc++.so (deflated 71%)
  adding: rootfs/lib/libc.so (deflated 45%)
  adding: rootfs/data/ (stored 0%)
  adding: rootfs/data/system/ (stored 0%)
  adding: rootfs/data/system/param/ (stored 0%)
  adding: rootfs/bin/ (stored 0%)
  adding: rootfs/bin/shell (deflated 60%)
  adding: rootfs/bin/init (deflated 88%)
  adding: rootfs/app/ (stored 0%)
  adding: rootfs/usr/ (stored 0%)
  adding: rootfs/usr/lib/ (stored 0%)
  adding: rootfs/usr/bin/ (stored 0%)
  adding: rootfs/system/ (stored 0%)
  adding: rootfs/system/internal/ (stored 0%)
  adding: rootfs/system/external/ (stored 0%)
  adding: rootfs/etc/ (stored 0%)
  adding: rootfs/etc/os-release (stored 0%)
[61/65] STAMP obj/kernel/liteos_a/make.stamp
[62/65] STAMP obj/kernel/liteos_a/kernel.stamp
[63/65] STAMP obj/build/lite/ohos.stamp
[64/65] ACTION //build/lite:gen_rootfs(//build/lite/toolchain:linux_x86_64_clang)
[65/65] STAMP obj/build/lite/gen_rootfs.stamp
ohos rk3126c build success!
```

编译得到文件用于烧写：

out / rk3126c / liteos.bin
out / rk3126c / rootfs.img



重启设备进入 liteos 内核：



完整补丁上传到附件。

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