

QorlQ LS1043A APPLICATION SOLUTION KIT (IoT, NAS, RGW)

Nov. 16, 2016





ABSTRACT

 This session provides an introduction on how to develop end products using the Application Solution Kit (ASK) for QorlQ LS1043A processors.





AGENDA

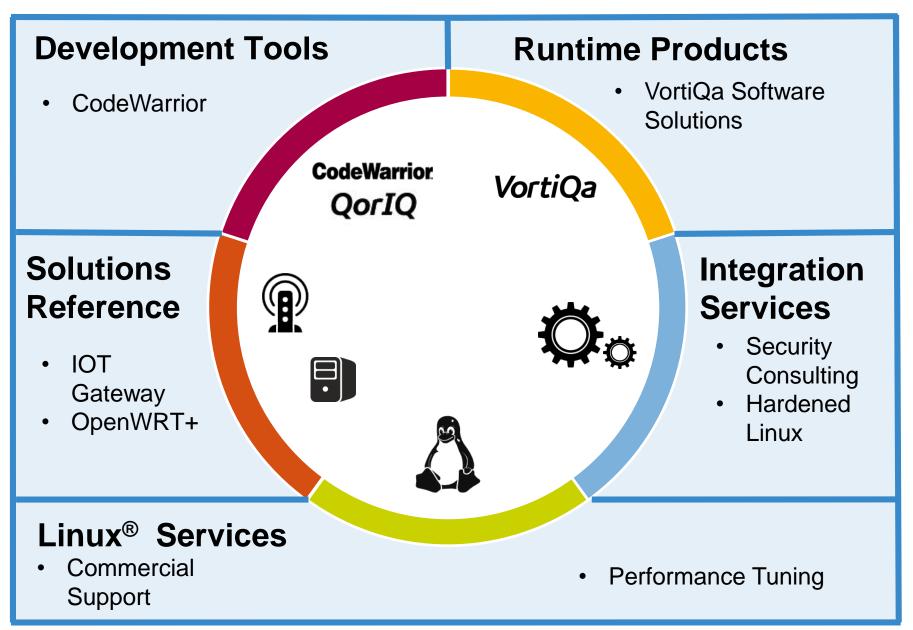
- ASK Description
- ASK: IOT, BHR and NAS
- NXP OpenWRT project
- Summary



ASK DESCRIPTION



Software Products and Services













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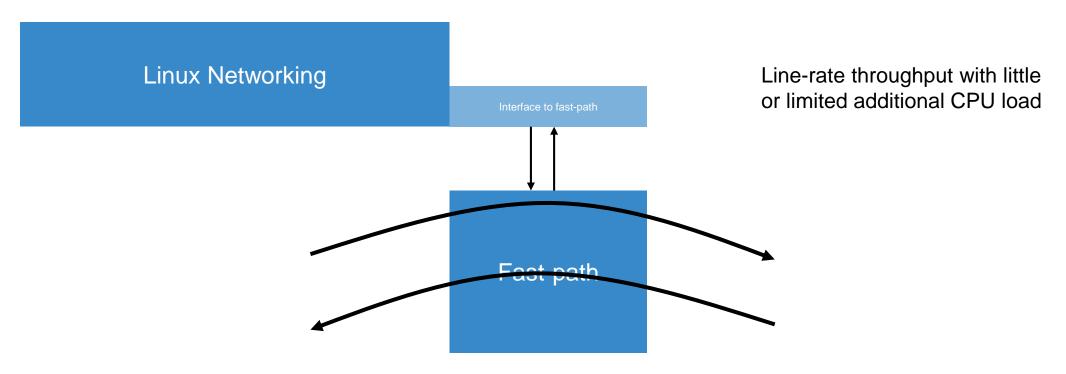
SDK vs. ADK vs. ASK

Complete Software Solutions / End-products System Level Benchmarking · Customer Use: Deployed, differentiated end products and solutions (Broadband Home Router) · Licensing, Maintenance and Support, Services **Application Specific Software Product** · Targeted, Bundled Protocols and **Applications** Scope / Capability • Middleware Components Application Specific Support (Offload) Solutions Kit • Customer Use: Differentiation, TTM Production use · Licensing, Maintenance and Support, **Market Enablement Software** Services Standard Industry Benchmarking · Customer Use: Eval/Validate Si, • Reference for System development **Applications** Offering · Maintenance, Support, Services • Enablement plus NW differentiation **Development Kit Applications** Maintenance and Support plus **Development Kit** Services Software Software Software **Development Kit** Devolupment Kit **Development Kit** Faster Time to Market / Greater customer value Pre-2013 2013 - 2014 2015+



Why Use the ASK

- Production-tested targeted packages
 - Can give a real head-start on end-product
- Gives access to BHR and NAS Fast Path, VoIP binaries and supporting software





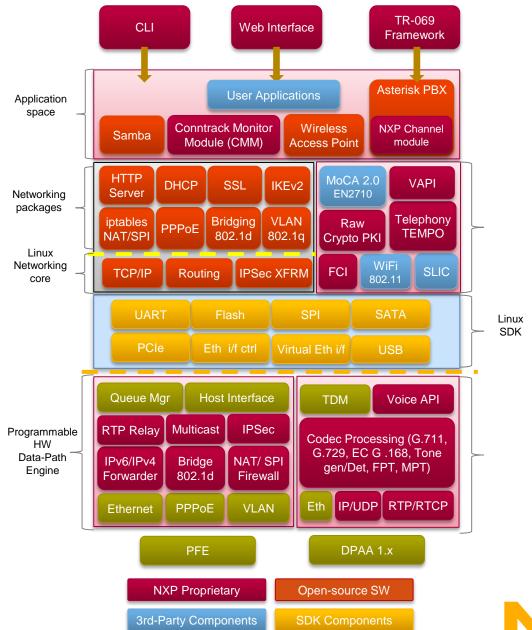
Application Solution Kits (ASK) – LS1

Personal Storage **Smart Home Small Business Router** Network attached storage Networking Internet of Things Wireless Personal **Smart Health Broadband Home** Storage Router Industrial 4.0 Chip on Drive Mobile Broadband Router **Integrated Services Network Attached** Mi-Fi Storage **Consumer Wireless Access Point Enterprise Access Point Security Gateway VoIP** Appliance IoT ASK **BHR ASK** NAS ASK



BHR Application Solution Kit

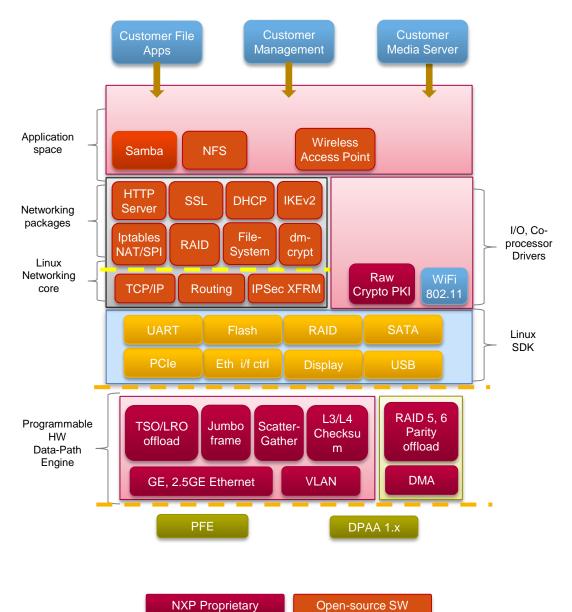
- Turnkey Market Specific Solutions
 - Application, Middleware and SDK integration
 - Full-featured and optimized
 - Deployable directly or via ODM partners
 - Systems Integration and Customization
- Target Markets
 - Multi-Service Gateways
 - Enterprise/Access Gateways
 - WLAN Access-points
 - Consumer/Prosumer NAS
 - Intelligent NIC adapters
 - IoT Gateways





Consumer NAS ASK

- Key Highlights
 - HW offload delivers best-in-class NAS performance
 - Rich set of RAID & file-system support
 - Secure storage and secure access of data
 - Optional VPU(ZN200) integration for hardware transcoding – delivers up to 4 simultaneous HD channels
 - Offloads
 - LRO/TSO, Jumbo-frame, checksum
 - RAID parity calculation, DMA
 - Highly optimized storage stack
 - Samba, NFS, HTTP, SSL
 - RAID 0, 1, 5, 6, JBOD support



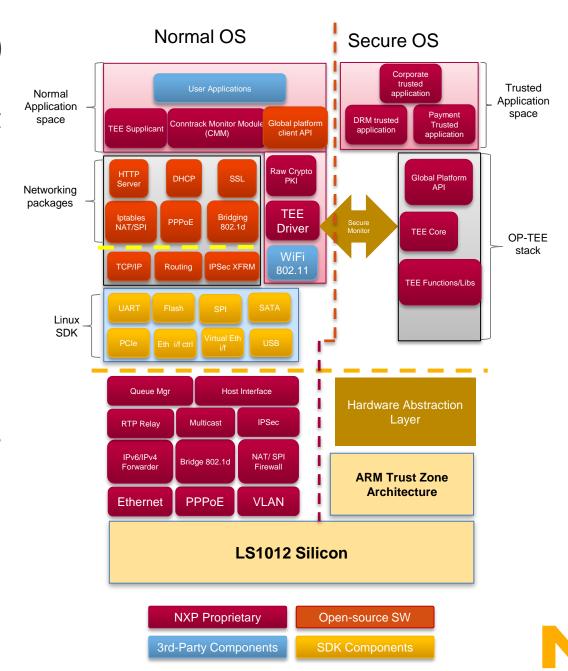
SDK Components

3rd-Party Components



IoT ASK (Available in Q32016)

- ARM Trustzone® execution environment
- SEC engine with symmetric and asymmetric crypto support
- Full-featured Op TEE stack
 - Secure OS
 - Secure key management
 - Global platform API support
- Networking and upper application layers
 - Feature rich and optimized networking stack
 - Optional Pre integrated Partner OSGi and JVM layers for quick Time to Market





NXP OpenWRT Project



NPX OpenWRT Project

Target:

Push LS1043A, LS1012A, LS1046A and LS1028A support to OpenWRT community in both 32bit and 64bit modes

- Silicon: LS1043A, LS1012A, LS1046A in 2016, LS1028A in 2017+
- Board: RDB board
- Required Kernel version: V4.4
 - V4.4 for 32bit and 64bit kernel.
- Referenced Kernel version: 4.4 & 4.1
- U-boot version: 2016. 01 from SDK2.0 or EAR releases
- Tool-chain: AArch32/AArch64 Tool chain from OpenWRT

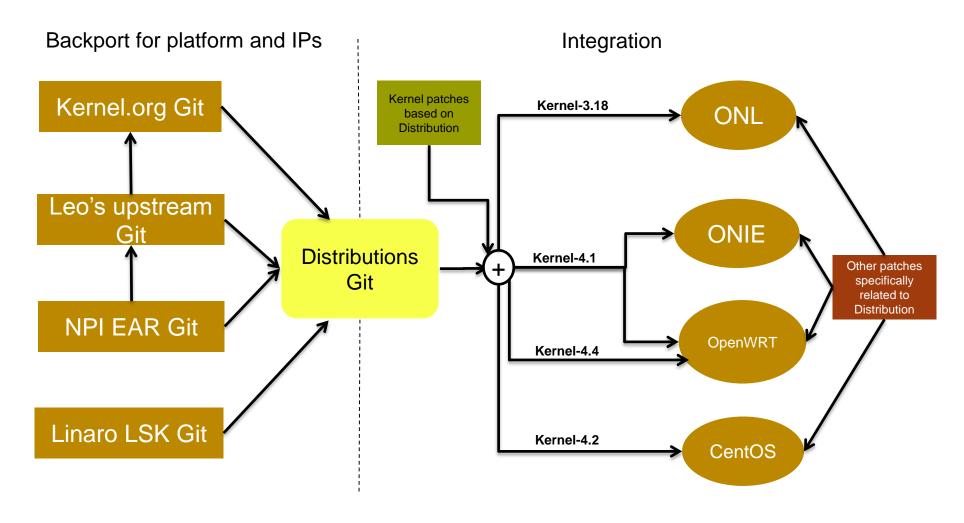


Feature list (Typical features used by OpenWRT)

- Platform support
- DDR Memory
- Serial Console support
- 1G/10G network port.
- USB host.
- SDIO driver
- PCIe Host bus.
- IFC NOR.
- IFC NAND.
- GPIO
- 12C
- Reset



General Process for Release of Distributions



The OpenWRT support process will align with the process for release of Distributions.



Preliminary Schedule for OpenWRT

ID	Task Name	Date
1	Submit LS1043A 32bit support to OpenWRT	The middle of July, 2016
2	Submit LS1043A 64bit support to OpenWRT	The middle of Aug, 2016
3	Submit LS1012A 64bit support to OpenWRT	The middle of Sep, 2016
4	Submit LS1012A 32bit support to OpenWRT	The beginning of Oct, 2016
5	Submit LS1046A 64bit support to OpenWRT	The end of October,2016
6	Submit LS1046A 32bit support to OpenWRT	The middle of November, 2016
7	Feedback handle and discussion with community	Until the end of march, 2017

Note: LS1028A 32bit support will align the ARMv8 32bit release.



Download OpenWRT sources

- Use git tool
 - git# git clone https://github.com/fsl-jyt/openwrt.git
 - git# cd openwrt

; list openwrt directories

```
openwrt# Is
- openwrt# git branch -a ; display all branches
           openwrt# git branch -a
            master
           * patchv4
            remotes/origin/HEAD -> origin/master
           remotes/origin/attitude_adjustment
            remotes/origin/barrier_breaker
           remotes/origin/chaos_calmer
           remotes/origin/ls1012ardb-ear1
            remotes/origin/master
            remotes/origin/patchv1
            remotes/origin/patchv2
           remotes/origin/patchv3
           remotes/origin/patchv4
           openwrt#
```

- openwrt# git checkout -b patchv4 origin/patchv4



Config OpenWRT

Openwrt# make menuconfig

```
Arrow keys navigate the menu. <Enter> selects submenus ---> (or empty
 submenus ---). Highlighted letters are hotkeys. Pressing <Y>
 includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to
 exit, <?> for Help, </> for Search. Legend: [*] built-in [ ] excluded
Target System (layerscape) --->
        Subtarget (layerscape 32b boards) --->
        Target Profile (ls1043ardb 32bit Profile) --->
       Target Images --->
       Global build settings --->
    [ ] Advanced configuration options (for developers) ----
    [ ] Build the OpenWrt Image Builder
    [ ] Build the OpenWrt SDK
    [ ] Package the OpenWrt-based Toolchain
    [ ] Image configuration --->
       Base system --->
      Boot Loaders ----
      Development --->
      Firmware --->
      Kernel modules --->
      Languages --->
       Libraries --->
       Network --->
       Utilities --->
                < Exit > < Help > < Save > < Load >
```



Config OpenWRT

- (in "make menuconfig")
 - select "Subtarget (Layersacpe xx boards)

```
Use the arrow keys to navigate this window or press the
hotkey of the item you wish to select followed by the <SPACE x
BAR>. Press <?> for additional information about this
layerscape 64b boards
            layerscape 32b boards
< Help >
```



Config OpenWRT

(in make menuconfig) Exit -> save

```
r37726@localhost:/opt/fsl/sdk/app/git/openwrt
  config - OpenWrt Configuration
    Arrow keys navigate the menu. <Enter> selects submenus ---> (or empty
    submenus ---). Highlighted letters are hotkeys. Pressing <Y>
    includes, <N> excludes, <M> modularizes features. Press <Esc> to
    exit, <?> for Help, </> for Search. Legend: [*] built-in [ ] excluded
   Farget System (layerscape) --->
          Subtarget (layerscape 32b boards) --->
           Target Profile (1s1043ardb 32bit Profile) --->
           Target Images --->
           Global build settings --->
       [ ] Advanced configuration options (for developers) ----
        [ ] Build the OpenWrt Image Builder
        [ ] Build the OpenWrt SDK
        [ ] Package the OpenWrt-based Toolchain
       [ ] Image configuration --->
           Base system --->
           Boot Config OpenWRT
           Development --->
           Firmware --->
           Kernel modules --->
           Languages --->
           Libraries --->
           Network --->
           Utilities --->
                     < Exit > < Help > < Save > < Load >
```



Build openwrt images

openwrt# make

```
make[1] world
```

make[2] target/compile

make[3] -C target/linux compile

make[2] package/cleanup

make[2] package/compile

make[3] -C package/libs/toolchain compile

make[3] -C package/libs/libnl-tiny compile

make[3] -C package/libs/libjson-c compile

make[3] -C package/utils/lua compile

make[3] -C package/libs/libubox compile

make[3] -C package/system/ubus compile

make[3] -C package/system/uci compile

make[3] -C package/network/config/netifd compile

make[3] -C package/system/ubox compile

make[3] -C package/libs/lzo compile

make[3] -C package/libs/zlib compile

. .



Openwrt build_dir

```
openwrt# ls ./build_dir/target-arm_cortex-a9_musl-1.1.15_eabi/
                                       ubox-2016-07-19
       busybox-1.24.2
                        lzo-2.09
       dropbear-2016.74 mbedtls-1.3.17 ubus-2016-07-02
       fstools-2016-07-24 mbedtls-2.3.0 uci-2016-07-04.1
                     netifd-2016-06-06 uclient-2016-01-28
       host
       json-c-0.12
                       opkg-unsigned usign-2016-07-04
       jsonfilter-2016-07-02 procd-2016-07-29
       ustream-ssl-polarssl
       libnl-tiny-0.1
                      root-layerscape util-linux-2.28
       libubox-2016-07-29
                                        zlib-1.2.8
                           stamp
       linux-layerscape_32b toolchain
       lua-5.1.5
                      ubi-utils-1.5.1
```



Openwrt image location

Linux image build_dir/target-arm_cortex-a9_musl-1.1.15_eabi/linuxlayerscape_32b/Image

 Root file system : Squashfs bin/layerscape/openwrt-layerscape-32b-ls1043ardb-32bit-squashfs-firmware.bin



Summary

- NXP provides ASK to deliver commercial softwaware, support, services and solutions.
- ASK for LS1 includes IOT ASK, BHR ASK and NAS ASK.
- NXP pushes LS1043A, LS1012A, LS1046A and LS1028A support to OpenWRT community in both 64b and 32b modes.
- LS1043A 64b/32b support to OpenWRT was uploaded as the planned schedule.





SECURE CONNECTIONS FOR A SMARTER WORLD