

Porting Tizen to Popular Reference Phone

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SVP of Thundersoft



the TOP Project

Tizen Open Porting

The Most Open and Powerful Mobile OS on the Most Popular Reference Design



TIZENTM v2.2



QRD 8916

- * 1.2Ghz Quad Core
- * 5" FWVGA
- * 1G Memory, 8G Flash
- * LTE
- * Dual SIM Dual Active



10 FREE Tizen QRD Devices, Just Ask or Contribute

Ask Questions



Contribute to
The TOP Project



A Little Bit of History

- 2005: Maemo (Nokia)
- **2006: Midinux (RedFlag)**
- **2007: Moblin (Intel)**
- **2008: Thundersoft Founded, the leading Mobile OS Provider**
- 2010: MeeGo (Nokia, Intel, other major hardware & software companies)
- 2010: Bada (Samsung : for less Android dependance)
- 2011: MeeGo abandoned by Nokia (for Windows Phone)
- 2011: MeeGo abandoned by Intel, and then by its other supporters
- 2011: LiMo 4 (LiMo Foundation - Samsung collaboration with the EFL project
- (Carsten Haitzler = Rasterman)
- **2011: Intel joins LiMo, which is renamed Tizen**
- 2012: LiMo Foundation is renamed Tizen Association
- 2012: Samsung has aim to merge Bada with Tizen



ThunderSoft

MeeGo™

TIZEN™

2007

2008

2009

2010

2011

2012

2013

2014

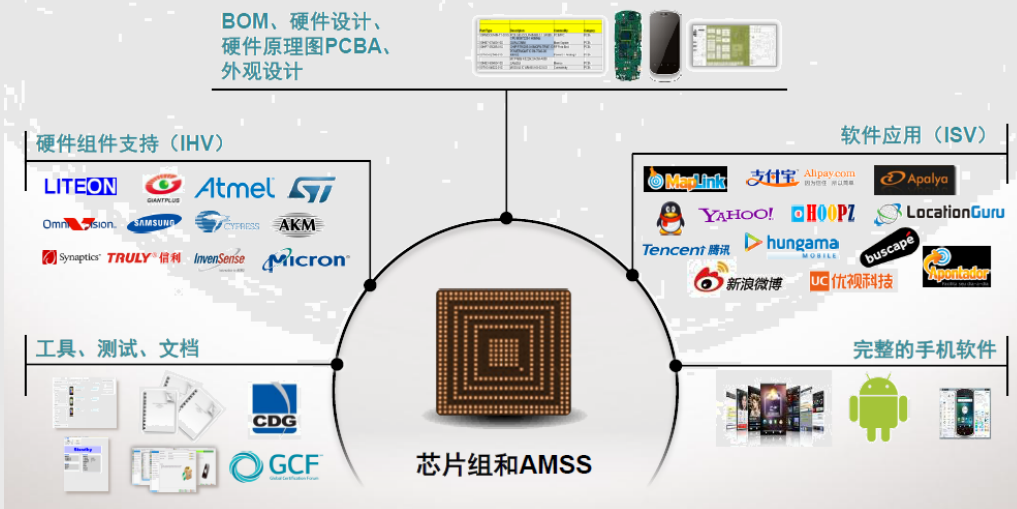


MID Midinux Team, 1997 @ Beijing IDF

TIZEN™ DEVELOPER SUMMIT
2014 SHANGHAI
TIZEN开发者峰会 (上海)

What's QRD?

“Qualcomm Reference Design (QRD) combines technology innovation, optimized design, hardware/software ecosystem, factory/development tools and altogether, and provides the turn-key solution for device vendor to release product in a more cost effective, broader and faster way.”



Nokia X



Xiaomi Note



Coolpad 5951



Lenovo Yoga Tablet 10



TCL M812



Lenovo A380t



Hisense U958



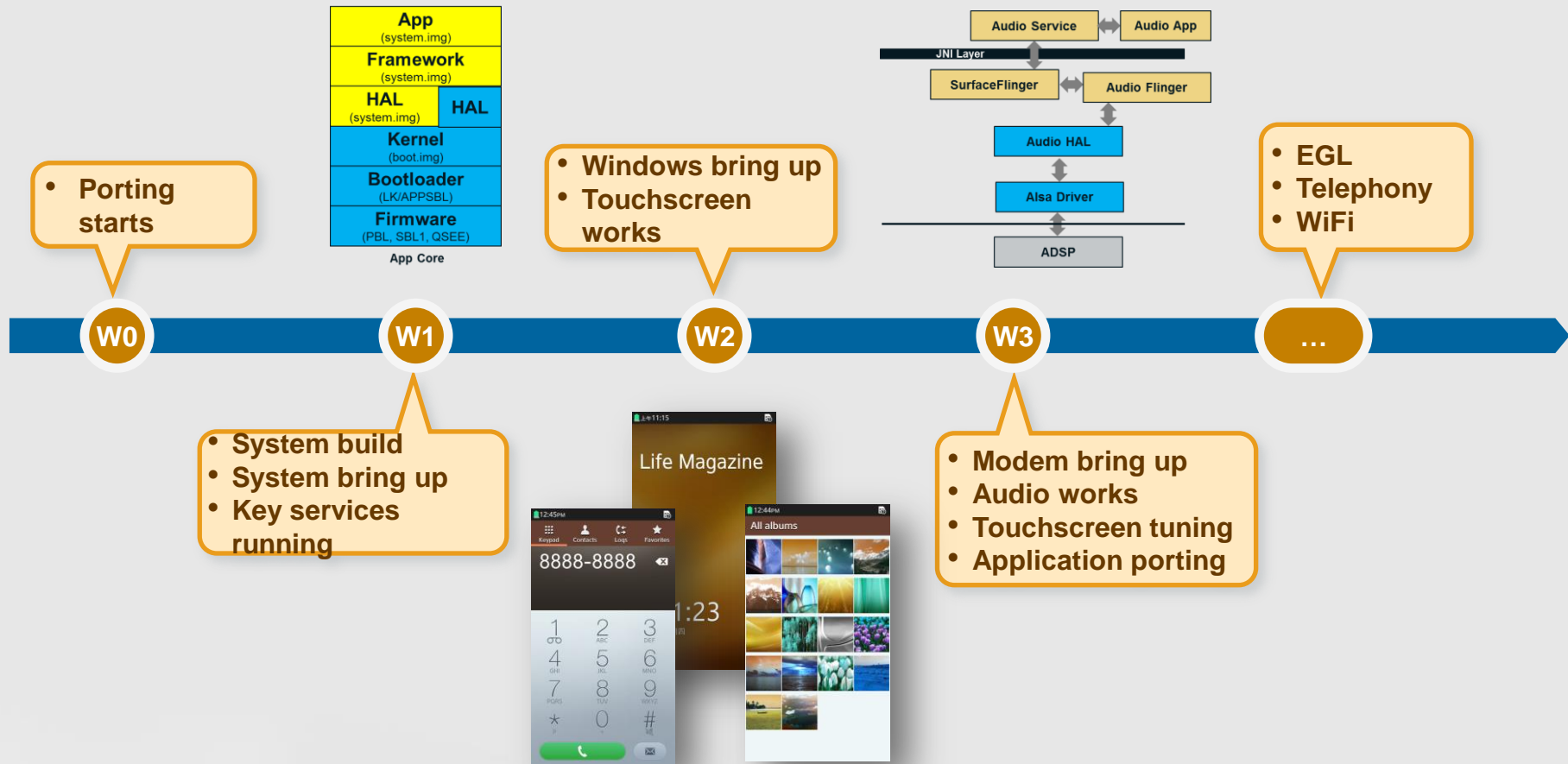
Little Cilly LA3

Why Tizen on QRD?

- The pleasure of hacking
- We have ported Ubuntu and FirefoxOS on QRD
- The most open and powerful operating system on the most popular turn-key solution
- More choices to OEM/OEM, operators and others.



Porting Roadmap



Porting Preparation

- QRD 8916 Devices
- Qualcomm BSP
- Tizen Development Environment
- Support from Tizen Community
- Support from Qualcomm

Key Features



- MSM8916 1.2Ghz Quad Core
- Dual SIM / Dual Active capable
- Derivative configurations for CT with minimal effort
- Graphics: Adreno 306 (400 MHz)
- Quick Charge 1.0
- USB host mode support
- NFC
- Language translations (12-15 languages)
- Support up to 1080p encode @ 30fps

High Level Specifications

- MSM8916, WTR1605L, PM8916, WCN3620, QCA1990
- RF360 - QFE2320, QFE2340, QFE2101
- Antenna Tuner – QFE1520/QFE1550
- Android 4.4 KitKat
- Configurations
- CT 4-mode: 1xSRLTE, DSDS C + G
- 5.0" FWVGA Multi-Touch LCD
- Camera: 5MP + 2MP
- LED flash
- 8GB eMMC, 8Gb LPDDR3 (eMCP) [533 MHz]
- MicroSD upto 64GB
- 3.5mm stereo headset jack
- Connectivity –
- WiFi 802.11 b/g/n/BT/FM (WCN3620)
- NFC (QCA 1990)
- GPS: AGPS/GLONASS/BEIDOU
- Sensors
- Light/Proximity/Accel
- QuickCharge 1.0 – SMB1360
- USB2.0 (microUSB). USB OTG
- 2-4-2 Half-board PCB with 3.0 mil trace

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Qualcomm Reference Design

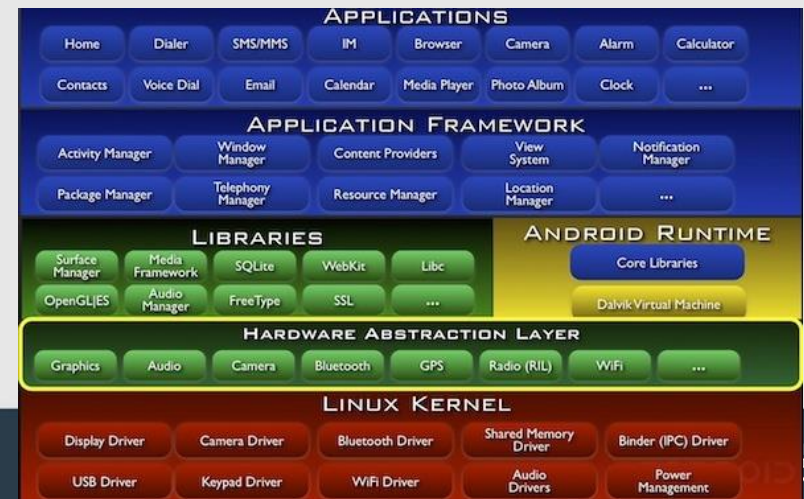
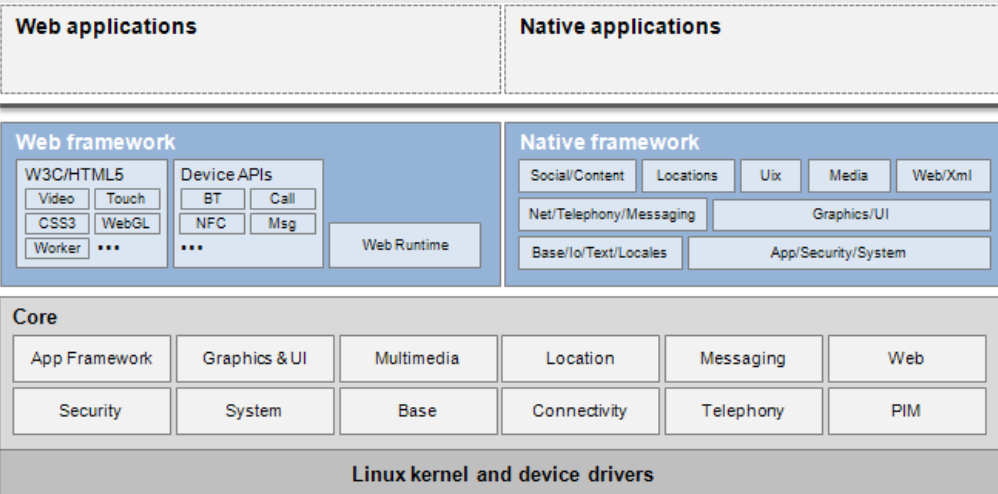
Qualcomm Reference Design (QRD), is designed as a series of reference design engineering prototype for smart phone . QRD is designed to streamline the rapid market introduction of Android™ smart phones at lower development costs — drawing on the technical innovation and product quality. QRD offers you tools to help bring your product to market faster — including testing and acceptance readiness for leading regional and operator requirements, a comprehensive ecosystem of third-party providers, and easy customization options that allow you to save engineering costs and focus your development efforts on differentiation. QRD positions you to compete more effectively.

QRD 7x27A & QRD 8x25 & QRD 8x25Q & QRD 8x30 Tablet & QRD8930 Smartphone, are sold by Thundersoft which is the sole exclusive sale agency in China, can be ordered and purchased directly online.

	QRD8916 DSDS: C + G 2-4-2 Half-Board Key Features • MSM8916 1.2Ghz Quad Core • Dual SIM / Dual Active...
	QRD8930 TD-LTE(SGL TE&CSFB) Attributes Dimensions: 8.9mm CS: July '13 High Level Specifications MSM8930, WTR1605L, WCD9304, WCN3660A, PM8038, QSC1215...
	QRD8x12 DSDS: TDS SS (option for T+G)

Architecture: Tizen vs. Android

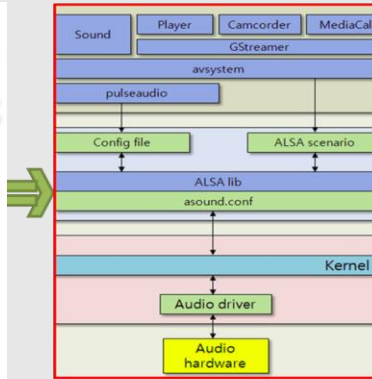
Component	Tizen	Android
Tool Chain	variant arm-linux-gcc	variant arm-linux-gcc
Build System	GBS	Google Android Make System
Kernel	Standard Linux Kernel	Modified Linux Kernel
Driver	standard driver	standard driver
HAL	tizen hal based input dev	android hal based input dev
Init	SystemD	Init
C Lib	glibc	Bionic
Audio	Alsa	TinyAlsa
Camera	V4l2	QC V4l2
Multimedia System	Gstreamer	Stagefright
Window System	X-Window/Wayland	SurfaceFlinger
App Framework	AUL/Web Runtime	Java
App Runtime	Native/Web Runtime	Dalvik
Wifi	wpa_supplicant	WCNSS
BT	BlueZ	BlueDroid/BlueZ
Graphics	EFL/OpenGLES	Skia/OpenGLES
Security	Similar sandbox model	Claim Permission



Architecture: Tizen vs. Qualcomm Android



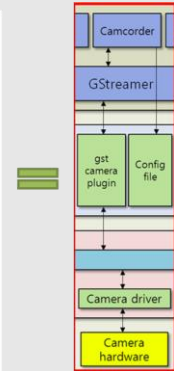
QRD Android Audio



Tizen Standard Audio



QRD Android Telephony

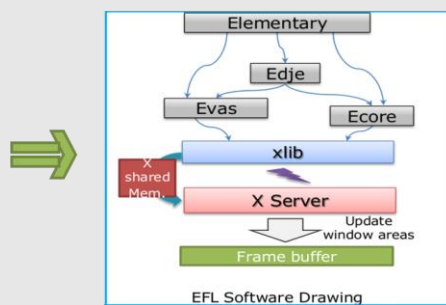


Tizen Telephony

Figure 12: Response control flow



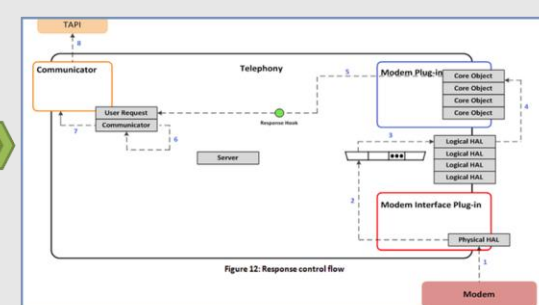
QRD Android Framebuffer



Tizen Standard Framebuffer



QRD Android Telephony

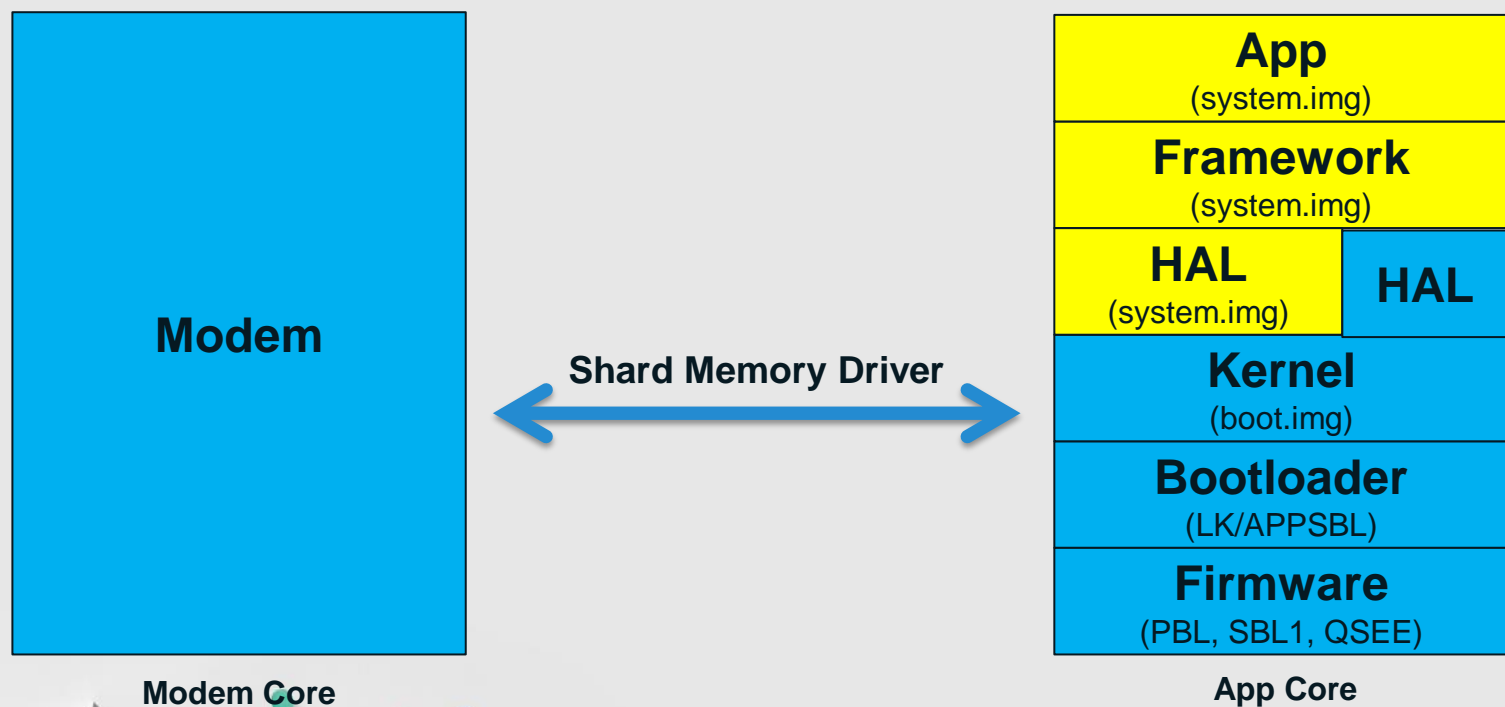


Tizen Telephony

Figure 12: Response control flow

Porting Strategy

- Option #1: Use kexec to multiboot the device
- Option #2: Start Android first then chroot to Tizen
- Option #3: Full system wipe and installation



Building Packages

- GBS – Git Building System

Linux Way

- Setup Building Environment
- Install Dependent Packages
- Have Fun with Dependency

Android Way

- Cross Building Environment
- Makefile Rules
- Auto Dependency Creation
- Package Build + Image Build



Dependency Correction

pkgmgr-info.spec | 1... x

192.168.33.81/tizen2/#/c/27/1/packaging/pkgmgr-info.spec

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All | My | Differences | Projects | Groups | Plugins | Documentation |
Side-by-Side | Unified | Commit Message | Preferences | Patch Sets | Files

Wu Hua <wuhua0721@thundersoft.com> | Settings | Sign Out

status:merged Search

packaging/pkgmgr-info.spec

Reviewed & next →

⇒ CMakeLists.txt Up to change pkgmgr-info.c ⇒

Patch Set Base 1	Patch Set 1
1 Name: pkgmgr-info	Name: pkgmgr-info
2 Summary: Package Manager information api for package	Summary: Package Manager information api for package
3 Version: 0.0.144	Version: 0.0.144
4 Release: 1	Release: 1
5 Group: Application Framework/Package Management	Group: Application Framework/Package Management
6 License: Apache-2.0	License: Apache-2.0
7 Source0: %{name}-%{version}.tar.gz	Source0: %{name}-%{version}.tar.gz
8 BuildRequires: cmake	BuildRequires: cmake
9 BuildRequires: pkgconfig(dialog)	BuildRequires: pkgconfig(dialog)
10 BuildRequires: pkgconfig(vconf)	BuildRequires: pkgconfig(vconf)
11 BuildRequires: pkgconfig(sqlite3)	BuildRequires: pkgconfig(sqlite3)
12 BuildRequires: pkgconfig(db-util)	BuildRequires: pkgconfig(db-util)
13 BuildRequires: pkgconfig(libxml-2.0)	BuildRequires: pkgconfig(libxml-2.0)
14 BuildRequires: pkgconfig(dbus-1)	BuildRequires: pkgconfig(dbus-1)
15 BuildRequires: pkgconfig(dbus-glib-1)	BuildRequires: pkgconfig(dbus-glib-1)
16 BuildRequires: pkgconfig(deviced)	
17	
18 %description	%description
19 Package Manager information api for packaging	Package Manager information api for packaging
20	
21 %package devel	%package devel
22 Summary: Package Manager information api (devel)	Summary: Package Manager information api (devel)
23 Group: Development/Libraries	Group: Development/Libraries
24 Requires: %{name} = %{version}-%{release}	Requires: %{name} = %{version}-%{release}
25 %description devel	%description devel
26 Package Manager information api (devel)	Package Manager information api (devel)
27	
28 %package parser	%package parser
29 Summary: Library for manifest parser	Summary: Library for manifest parser
30 Group: Application Framework/Package Management	Group: Application Framework/Package Management
31 Requires: %{name} = %{version}-%{release}	Requires: %{name} = %{version}-%{release}
32	
33 %description parser	%description parser
34 Library for manifest parser	Library for manifest parser
35	
36 %package parser-devel	%package parser-devel
37 Summary: Dev package for libpkgmgr-parser	Summary: Dev package for libpkgmgr-parser
38 Group: Development/Libraries	Group: Development/Libraries
39 Requires: %{name} = %{version}-%{release}	Requires: %{name} = %{version}-%{release}

Installation File Correction

osp-web.spec | 192... x +

192.168.33.81/tizen2/#/c/24/1/packaging/osp-web.spec

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```
thumb -Wa,-mimplicit-it=thumb -funwind-tables -D_OSP_DEBUG -D_SECURE_LOG -D_OSP_ARMEL" cmake . -DC
MAKE_INSTALL_PREFIX=%{_prefix} -DFULLVER=%{version} -DMAJORVER=${MAJORVER}
%else
COXFLAGS="-O2 -g -pipe -Wall -fno-exceptions -Wformat -Wformat-security -Wl,-as-needed -fmessage-le
ngth=0 -march=armv7-a -mtune=cortex-a8 -mlittle-endian -mcpu=neon -mfloat-abi=softfp -D_SOFTFP__m
thumb -Wa,-mimplicit-it=thumb -funwind-tables -D_OSP_DEBUG -D_OSP_ARMEL" cmake . -DCMAKE_INSTALL_P
REFIX=%{_prefix} -DFULLVER=%{version} -DMAJORVER=${MAJORVER}
%endif
%endif
# Call make instruction with smp support
make %{?jobs:-j%jobs}
%install
rm -rf %{buildroot}
mkdir -p %{buildroot}/usr/share/license
cat %{_libdir}/%(name)-%{version}/LICENSE.APLv2.0 >> %{buildroot}/usr/share/license/%{name}
%make_install
%post -p /sbin/ldconfig
%postun -p /sbin/ldconfig
%files
%manifest osp-web.manifest
/usr/share/license/%{name}
%{_libdir}/osp/libosp-web.so*
%{_libdir}/osp/browser-plugin/*.so
%files devel
%{_includedir}/osp/*.h
%{_libdir}/pkgconfig/osp-web.pc
%files internal-devel
%{_includedir}/osp/web/controls/*.h
%files debug
%{_libdir}/osp/debug/*.so.*
%{_libdir}/osp/browser-plugin/debug/*.so
```

```
thumb -Wa,-mimplicit-it=thumb -funwind-tables -D_OSP_DEBUG -D_SECURE_LOG -D_OSP_ARMEL" cmake . -DC
MAKE_INSTALL_PREFIX=%{_prefix} -DFULLVER=%{version} -DMAJORVER=${MAJORVER}
%else
COXFLAGS="-O2 -g -pipe -Wall -fno-exceptions -Wformat -Wformat-security -Wl,-as-needed -fmessage-le
ngth=0 -march=armv7-a -mtune=cortex-a8 -mlittle-endian -mcpu=neon -mfloat-abi=softfp -D_SOFTFP__m
thumb -Wa,-mimplicit-it=thumb -funwind-tables -D_OSP_DEBUG -D_OSP_ARMEL" cmake . -DCMAKE_INSTALL_P
REFIX=%{_prefix} -DFULLVER=%{version} -DMAJORVER=${MAJORVER}
%endif
%endif
# Call make instruction with smp support
make %{?jobs:-j%jobs}
%install
rm -rf %{buildroot}
mkdir -p %{buildroot}/usr/share/license
cat %{_libdir}/%(name)-%{version}/LICENSE.APLv2.0 >> %{buildroot}/usr/share/license/%{name}
%make_install
%post -p /sbin/ldconfig
%postun -p /sbin/ldconfig
%files
%manifest osp-web.manifest
/usr/share/license/%{name}
%{_libdir}/osp/libosp-web.so*
%{_libdir}/osp/browser-plugin/*.so
%files devel
%{_includedir}/osp/*.h
%{_libdir}/pkgconfig/osp-web.pc
%files internal-devel
%{_includedir}/osp/web/controls/*.h
%files debug
%{_libdir}/osp/debug/*.so.*
%{_libdir}/osp/browser-plugin/debug/*.so
/usr/lib/debug/*
/usr/src/debug/*
/usr/lib/debug/.*
```

Commit Message

Up to change

Press "?" to view keyboard shortcuts
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Path Correction

CMakeLists.txt | 192... x +

192.168.33.81/tizen2/#/c/25/1/privacy-popup/CMakeLists.txt

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Patch Set Base 1

Patch Set 1

```
1 INCLUDE(FindPkgConfig)
2 pkg_check_modules(privacy-popup_pkgs
3   REQUIRED
4   ecore-x
5   ul-gadget-1
6   dlog
7   appcore-efl
8   privacy-manager-client
9   pkgmgr-info
10 )
11 SET (this_target tizenpvnv00.privacy-popup)
12 SET (manifest_target privacy-popup.xml)
13
14 SET(SRCS
15   src/privacy-popup.c
16 )
17
18 INCLUDE_DIRECTORIES(${privacy-popup_pkgs_INCLUDE_DIRS})
19 INCLUDE_DIRECTORIES(/inc)
20
21
22 FIND_PROGRAM(UNAME NAMES uname)
23 EXEC_PROGRAM("${UNAME}" ARGS "-m" OUTPUT_VARIABLE "ARCH")
24
25 IF("${ARCH}" STREQUAL "arm")
26   ADD_DEFINITIONS("-DTARGET")
27   MESSAGE("add -DTARGET")
28 ENDIF("${ARCH}" STREQUAL "arm")
29
30 MESSAGE("CMAKE_INSTALL_PREFIX: ${CMAKE_INSTALL_PREFIX}")
31
32 ADD_EXECUTABLE(${this_target} ${SRCS})
33
34 ADD_DEPENDENCIES(${this_target} privacy-manager-client)
35 TARGET_LINK_LIBRARIES(${this_target} ${privacy-popup_pkgs_LDFLAGS} ${privacy-popup_pkgs_LIBRARIES})
36
37 INSTALL(TARGETS
38   ${this_target}
39   DESTINATION
40     /usr/bin/
41 )
42 INSTALL(FILES ${CMAKE_SOURCE_DIR}/packaging/${manifest_target} DESTINATION /usr/share/packages)
```

[Commit Message](#)

↑ Up to change

Press ? to view keyboard shortcuts
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GBS is Good with Good .gbs.conf

- Multi-thread Building?
- What Packages to Exclude?

```
general
tmpdir=/var/tmp/
profile = profile.tizen2.2
work_dir=.

[repo.tizen2.2_arm]
url=${work_dir}/pre-built/toolchain-arm/

[repo.tizen2.2_x86]
url=${work_dir}/pre-built/toolchain-x86/

[profile.tizen2.2]
repos=repo.tizen2.2_arm, repo.tizen2.2_x86
buildconf=${work_dir}/scm/meta/build-config/build.conf

#exclude_packages=gcc,cmake,libva,python-magic,nss

exclude_packages=bash,bzip2-libs,c-ares,cmake,coreutils,diffutils,eglibc,elfutils-libelf,elfutils-libs,elfutils,fdupes,file,findutils,gawk,gmp,gzip,libacl,libattr,libcap,libcurl,libfile,libgcc,liblua,libstdc++,make,mpc,mpfr,ncurses-libs,nodejs,nspr,nss-softoken-freebl,nss,openssl,patch,popt,rpm-build,rpm-libs,rpm,sed,sqlite,tar,xz-libs,zlib,binutils,gcc

exclude_packages=gcc,cmake,libva,python-magic,nss
```

Image Building

- MIC msm8916_32.ks
- make_ext4fs
 - # sudo make_ext4fs -s -l 1140000000 platform.simg /media/xxx/platform

```
# *-mic2-options-* -f loop --pack-to=@NAME@.tar.gz *-mic2-options-*  
  
#  
# Do not Edit! Generated by:  
# kickstarter.py  
#  
  
lang en_US.UTF-8  
keyboard us  
timezone --utc America/Los_Angeles  
# ROOT fs partition  
part / --size=3000 --ondisk mmcblk0p --fstype=ext4 --label=platform  
# DATA partition  
part /opt/ --size=3000 --ondisk mmcblk0p --fstype=ext4 --label=data  
# UMS partition  
part /opt/usr/ --size=3000 --ondisk mmcblk0p --fstype=ext4 --label=ums  
  
...  
  
repo --name=Tizen-main --baseurl=http://download.tizen.org/releases/2.2/tizen-  
2.2/repos/tizen-main/armv7l/packages/ --save --ssl_verify=no --priority=99  
repo --name=Tizen-base --baseurl=http://download.tizen.org/releases/2.2/tizen-  
2.2/repos/tizen-base/armv7l/packages/ --save --ssl_verify=no --priority=99  
repo --name=local --baseurl=file:///home/wuhua/GBS-  
ROOT/local/repos/tizen2.2/armv7l --priority=1  
...
```

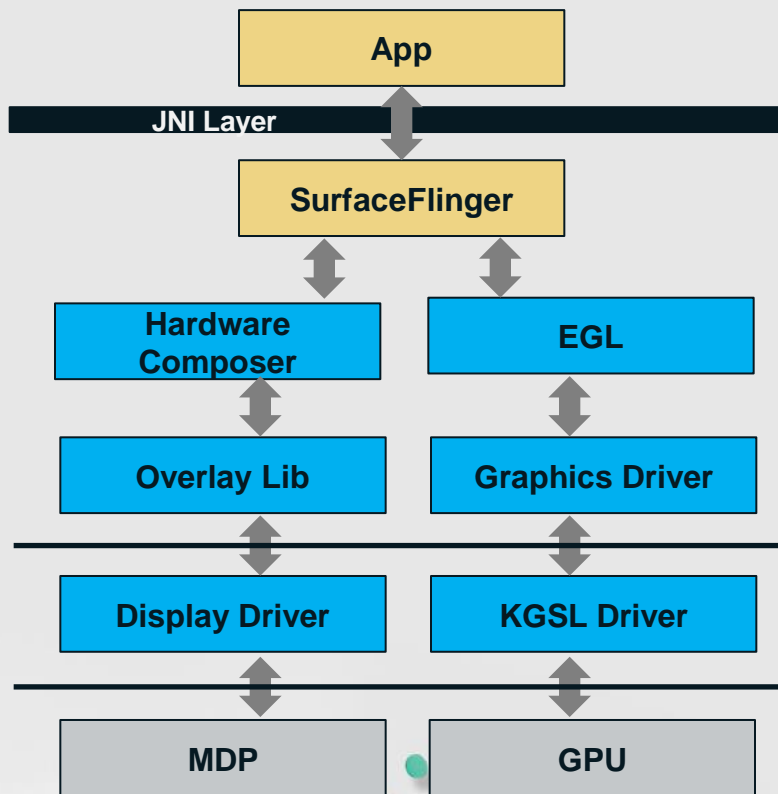
Msm8916_32.ks

```
--- a/ext4_utils/make_ext4fs.c  
+++ b/ext4_utils/make_ext4fs.c  
@@ -164,6 +164,8 @@ static u32 build_directory_structure(const char  
*full_path, const char *dir_path  
    dentries[i].size = stat.st_size;  
    dentries[i].mode = stat.st_mode &  
(S_ISUID|S_ISGID|S_ISVTX|S_IRWXU|S_IRWXG|S_IRWXO);  
    dentries[i].mtime = stat.st_mtime;  
+    dentries[i].uid = stat.st_uid;  
+    dentries[i].gid = stat.st_gid;  
    uint64_t capabilities;  
    if (fs_config_func != NULL) {  
#ifdef ANDROID  
@@ -242,7 +244,9 @@ static u32 build_directory_structure(const char  
*full_path, const char *dir_path  
    inode = make_directory(dir_inode, entries, dentries, dirs);  
  
    for (i = 0; i < entries; i++) {  
-        if (dentries[i].file_type == EXT4_FT_REG_FILE) {  
+        if ((dentries[i].file_type == EXT4_FT_REG_FILE) ||  
+            (dentries[i].file_type == EXT4_FT_CHRDEV) ||  
+            (dentries[i].file_type == EXT4_FT_BLKDEV)) {  
            entry_inode = make_file(dentries[i].full_path,  
dentries[i].size);  
        } else if (dentries[i].file_type == EXT4_FT_DIR) {  
            char *subdir_full_path = NULL;
```

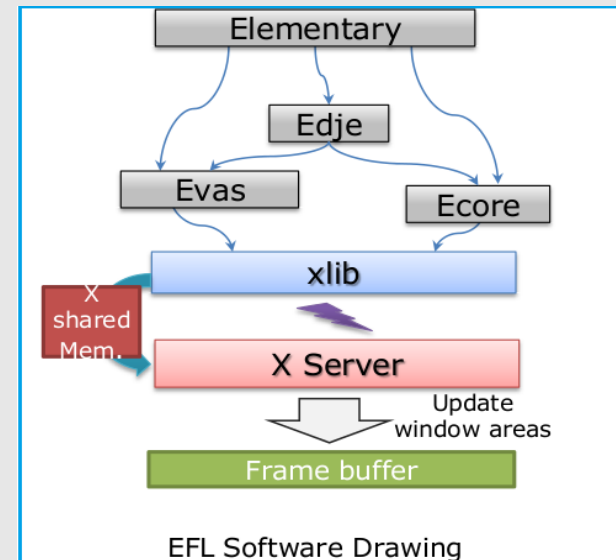
make_ext4fs

Display

- QRD only supports Overlay & OpenGL/ES
- Framebuffer is enabled to support Xwindows
- aRGB (Tizen) vs. RGBa (Qualcomm)



```
if (mdss_fb_alloc_fbmem(mfd)) {  
    » if (mdss_fb_alloc_fb_ion_memory(mfd))  
    » » pr_warn("unable to allocate fb memory in fb register\n")  
    » » ;  
}
```



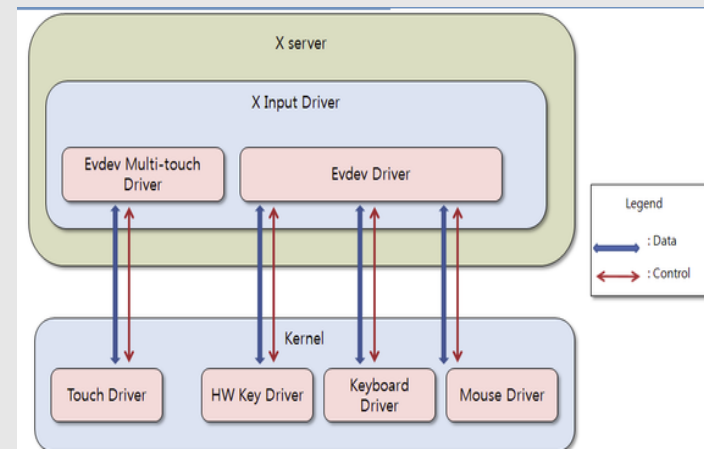
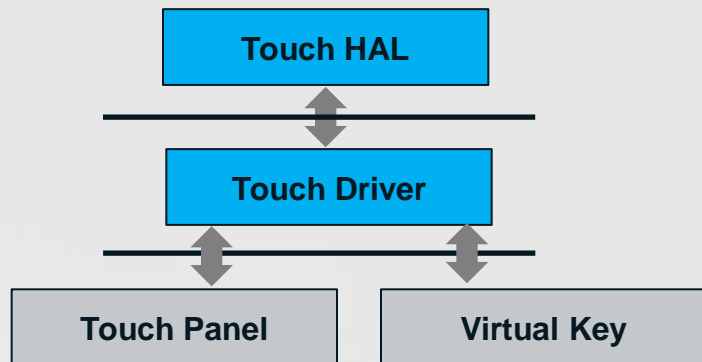
Touch Panel

- Qualcomm: Touch event and Virtual key event use the same event interface (/dev/eventX)
- Tizen: Touch event and Virtual key event are sent using different interface

```
#ifdef FT5X06_VIRTUAL_KEY
input_key_dev = input_allocate_device();
if (!input_key_dev) {
    dev_err(&client->dev, "failed to allocate input key device\n");
    return -ENOMEM;
}

input_key_dev->name = "ft5x06_ts_kbd";
input_key_dev->id.bustype = BUS_I2C;
input_key_dev->dev.parent = &client->dev;
```

```
#ifdef FT5X06_VIRTUAL_KEY
» » if (status == FT_TOUCH_DOWN || status == FT_TOUCH_CONTACT) {
» » » if ((x == 0x78) && (y == 0x384) && (menudown == 0)) {
» » » » menudown = 1;
» » » » input_report_key(input_key_dev, KEY_PHONE, 1);
» » » » update_key_input=true;
» » » » }
» » » if ((x == 0xf0) && (y == 0x384) && (homedown == 0)) {
» » » » homedown = 1;
» » » » input_report_key(input_key_dev, KEY_MENU, 1);
» » » » update_key_input=true;
» » » }
» » }
```

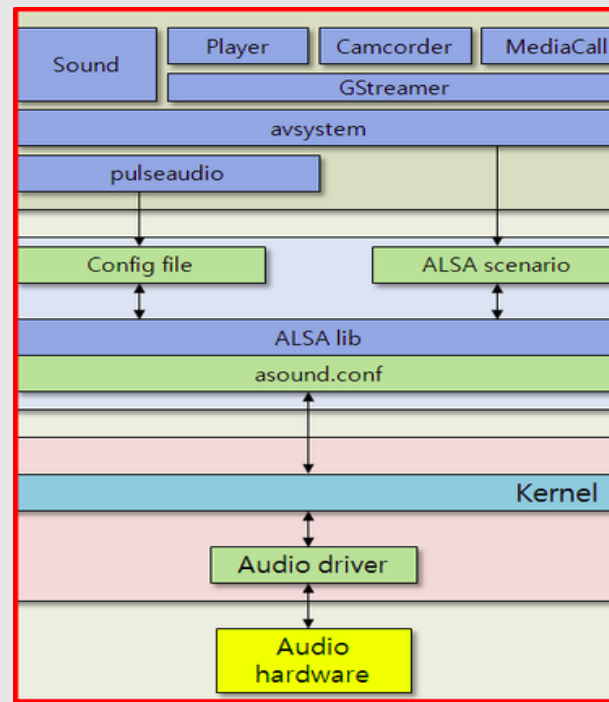
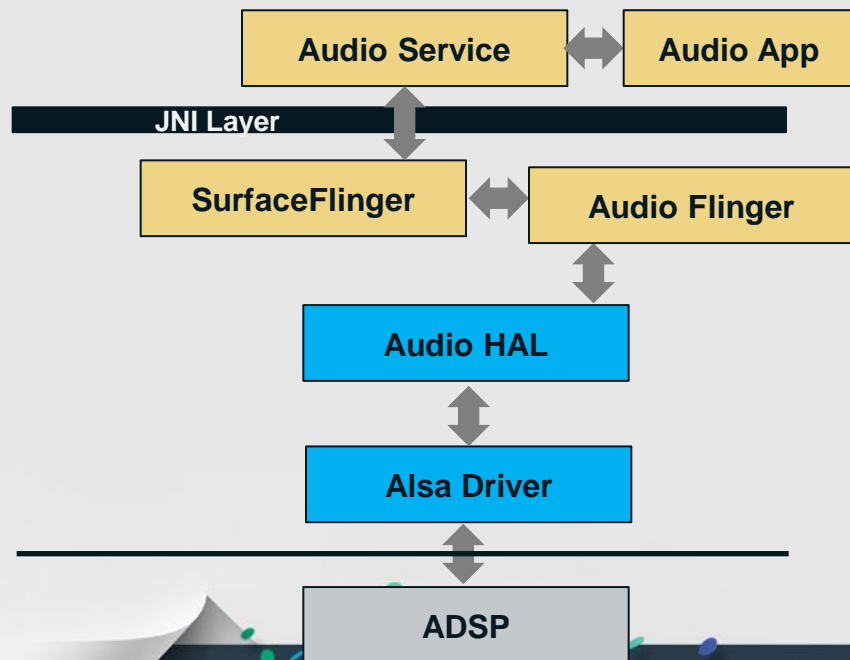


Audio

- **Audio and Modem**

- In 8916, Modem needs to be brought up in order to enable audio (DSP)
- Need to start ueventd to create device node like /dev/smd0
- Run rmt_storage to init modem

- **TinyAlsa vs. ALSA**



Run Android Services on Tizen

- Linker & Loader is different
- Run Android “init” along with systemD
- Pull-in the necessary services
- Use Android lib in Tizen

<https://github.com/libhybris>

	Tizen	Android
Loader	Ld-linux.so	Linker
Dynamic Lib Search Path	/user/lib/osp /usr/lib /lib	/vendor/lib /system/lib
Typical Dynamic Libs	# ldd bash /usr/lib/libsys-assert.so /lib/libdl.so.2 /lib/libgcc_s.so.1 /lib/libc.so.6 /lib/ld-linux.so.3 /lib/libunwind.so.8 \	# ldd rild liblog.so libcutils.so libril.so libdl.so libc.so libstdc++.so libm.so

```
static soinfo* solist = &libdl_info;
static soinfo* sonext = &libdl_info;
static soinfo* somain; /* main process, always the one
after libdl_info */

static const char* const gSoPaths[] = {
    "/vendor/lib",
    "/system/lib",
    NULL
};

static char gLdPathsBuffer[LDPATH_BUFSIZE];
static const char* gLdPaths[LDPATH_MAX + 1];

static char gLdPreloadsBuffer[LDPRELOAD_BUFSIZE];
static const char* gLdPreloadNames[LDPRELOAD_MAX + 1];
```

linker.cpp

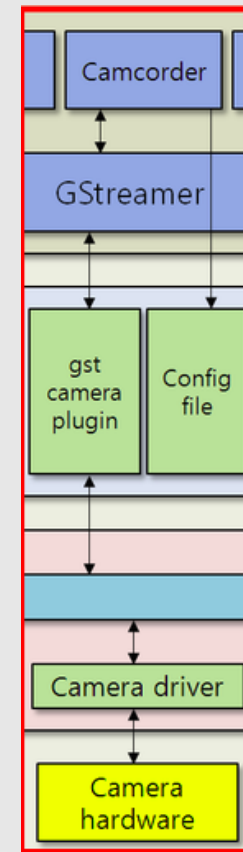
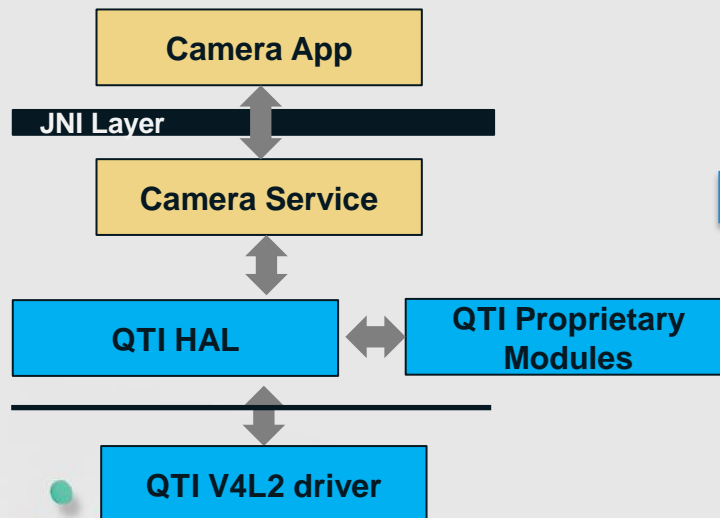
```
EGLBoolean eglInitialize(EGLDisplay dpy, EGLint *major,
EGLint *minor)
{
    EGL_DLSYM(&_eglInitialize, "eglInitialize");
    return (*_eglInitialize)(dpy, major, minor);
}

void *android_dlopen(const char *filename, int flag)
{
    soinfo *ret;

    pthread_mutex_lock(&dl_lock);
    ret = find_library(filename);
    if (unlikely(ret == NULL)) {
        set_dlerror(DL_ERR_CANNOT_LOAD_LIBRARY);
    } else {
        call_constructors_recursive(ret);
        ret->refcount++;
    }
    pthread_mutex_unlock(&dl_lock);
    return ret;
}
```

Camera

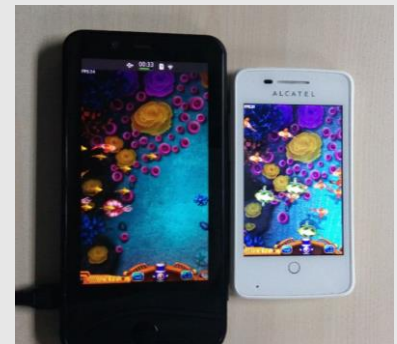
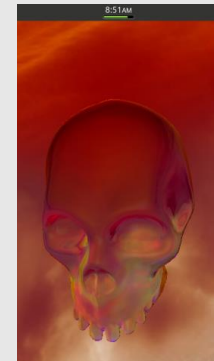
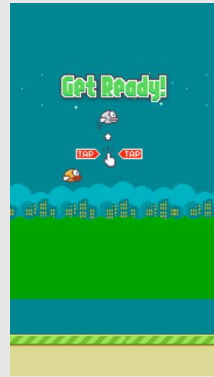
- QTI V4L2 vs. Standard V4L2
- Camera driver in user space
 - m-qcamera-daemon
 - Liboemcamera.so
 - libmmcamera2_stats_modules.so (3A lib)
 - libmmcamera2_sensor_modules.so (sensor related lib)
 - libmmcamera2_pproc_modules.so (Post-processing lib)
 - libmmcamera2_imglib_modules.so (Images related lib)



Web App Porting

- **Tizen web app vs. FirefoxOS app**
 - Web API, Device API, Packaging, Syntax, etc.

	Tizen	FirefoxOS
Web Engine	webkit2	gecko
Javascript Engine	JavaScript core	Spider monkey
Web Render	Cairo	Skia
App Declaration	config.xml (xml format)	manifest.webapp (json format)
"const" support	no	yes
bluetooth API	non-standard	non-standard
ambient light sensor API	non-standard (via SensorManager)	W3C
WebFM	No	Yes
Alarm	non-standard (AlarmManager)	W3C
Simple Push API	not supported	not supported



497 Tizen 2.2	434 Android 4.4.3	473 Firefox Mobile 30
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Next Step

- Release the source code
- EGL
- Telephony
- WiFi
- Gstreamer plug-in for Camera
- Sensors

Resources

- **from Tizen to Android**
 - http://events.linuxfoundation.org/sites/events/files/als13_dupuis_tizen.pdf
- **Tizen Porting Guide**
 - https://wiki.tizen.org/wiki/Porting_Guide
- **porting Tizen on Allwinner A10**
 - <https://github.com/leon-anavi/tizen-sunxi>
- **Linux on Snapdragon**
 - <https://www.codeaurora.org/projects/all-active-projects/qc-linux>
 - <http://releases.linaro.org/latest/ubuntu/ifc6410>

Q & A



- www.thundersoft.com
- store.thundersoft.com
- zoupc@thundersoft.com

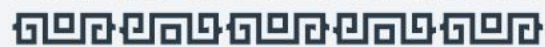


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	Device API Support (total 56)	not supported	supported		HTML Score
Tizen	56	18	38	0.678571429	497
Firefox	56	26	30	0.535714286	473