# RK1108 Network Interconnection Introduction

Sep., 2016

雷起斌

# Foreword

In recent years, mobile communication and Internet has become the fastest growing, most market potential and most attractive business.  As time changed, mobile Internet is gradually filter into people live, work, SMS, bell figure download, mobile music, games, video applications, mobile payment and  location service. People have more and more used to work through phone, which provides limitless possibilities of mass applications. Therefore, network interconnection of mobile phone and terminal equipment is the trend of the times.

RK1108 network interconnection function consists of two parts, streaming media server and mobile phone APP. At present, this function is mainly designed for RK1108 car DVR. Communicating via WIFI, it can satisfy demands such as cellphone cameras live, file downloads, parameter Settings.

Mobile APP has iOS and Android version,  respectively developed via object-c and Java development to change setting, live, online play, download files, etc. Streaming media server is developed via C language to provide streaming and file downloads service.

# APP Features

1) Camera Live

2) File Download (support breakpoint resume and multi-tasking)

3) Video Play (online play, local play, screenshot, gesture Control, etc.)

4) Local File Management

5) Photo Album (support gestures for zooming, switch)

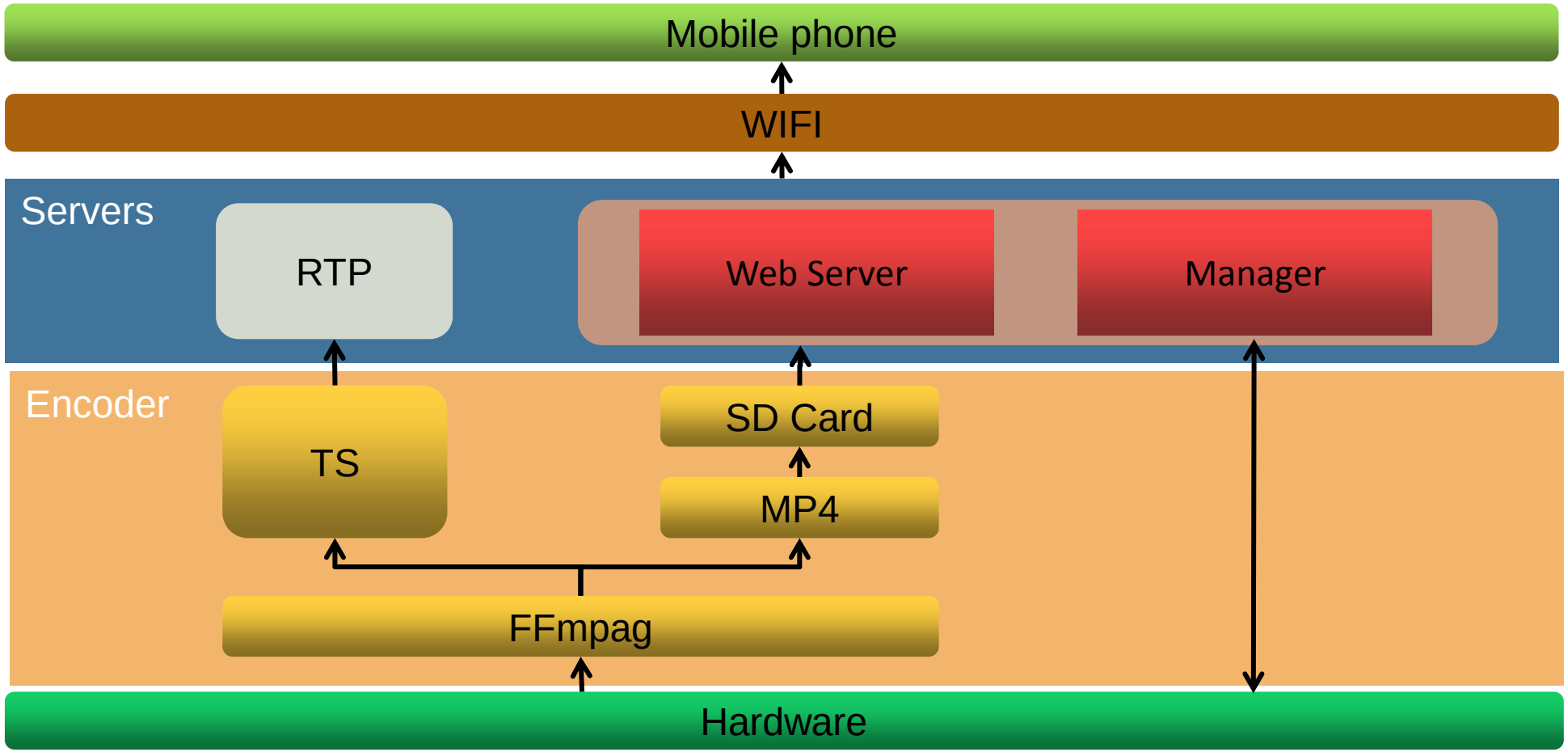
6) Parameter Setting

7) iOS and Android Version, respectively developed via object-c and Java development

# Interface Style

# Interface Style

# Basic Framework



# Basic Framework

- Encoder

  FFmpag Encoding, audio and video data collected by camera will be converted to TS stream through ffmpag coding to be pushed to server, or converted to MP4 file written in SD card.

- Servers

  Servers consists of three parts, RTP server, Web Server and customer defined Manager, and TS stream network encapsulation is performed by FFmpag. Web Server is lightweight Web Server, mainly used for file downloads, Web thumbnail interception, etc. Manager is mainly responsible for finishing WIFI initialization and implementing some customer-defined protocol.

- WIFI

  WIFI currently uses standard WPA.

- Player

  VLC is the streaming media player of mobile phones. It has Android and iOS version, support many audio and video formats such as RTP, RTSP and RTMP protocol.

# Operation Process

1) Execute device end video program, send hot spot RK_CVR_ *.
2) Connect the phone and hot spot through system Settings menu.
3) Open APP, the APP will automatically search for the device.
4) Switch to STA mode or change password through system Settings menu

5) Reboot device to  initialize WIFI with new configuration.
6) Exit Mobile phone application, enter system Settings menu, set up mobile phone hot or relink WIFI.

# WIFI Initialization

WIFI initialization is executed in default \app\video\wifi_management.c, \app\video\wifi_management.c is a part of video program , when video is used, call function wifi_management_start. wifi_management_start initializes WIFI via WPA. If user doesn't run video, input below demand on terminal can realize WIFI initialization as well.

STA Mode:

```
echo 1 > sys/class/rkwifi/driver
ifconfig wlan0 up;
wpa_supplicant -Dnl80211 -c /tmp/wpa_supplicant.config -iwlan0 -B;
udhcpc -i wlan0 -b;
```

AP Mode:

```
echo 1 > sys/class/rkwifi/driver
ifconfig lo 127.0.0.1 netmask 255.255.255.0;
ifconfig wlan0 192.168.100.1 netmask 255.255.255.0;
dnsmasq -C /etc/dnsmasq.conf;
hostapd /tmp/hostapd.conf -B;
```

# AP Configuration File

/tmp/hostapd.conf decides AP SSID, PASSWORD, reference configuration is shown as follow：

```
interface=wlan0
driver=nl80211
ssid=RK_CVR
channel=6
hw_mode=g
ignore_broadcast_ssid=0
auth_algs=1
wpa=3
wpa_passphrase=123456789
wpa_key_mgmt=WPA-PSK
wpa_pairwise=TKIP
rsn_pairwise=CCMP
```

# STA Configuration File

/tmp/wpa_supplicant.config is configuration file on STA mode, reference configuration is shown as follow：

```
ctrl_interface=/var/run/wpa_supplicant
ap_scan=1
network={
        proto=RSN
        key_mgmt=WPA-PSK
        pairwise=CCMP TKIP
        group=CCMP TKIP
        ssid=RK_CVR
        psk=123456789
}
```

# Notes

1) Currently, only tmp folder is writable.

2) WPA default is not compiling,  it can opened via setting enable_wpa=yes in \config\package_config.sh.

# User-defined Protocol

In addition to WIFI initialization, \app\video\wifi_management.c is also responsible for define socket communication protocol, which is mainly used for device discovery, file list acquisition and parameter settings. Users can modify \app\video\wifi_management.c to define protocol or realize these functions via API on later SDK.

# Web Server

The embedded Web Server is mainly used to realize playback and download function. IOS and Android provide a large number of methods for HTTP protocol. Mobile phone developers can easily use these system interfaces to complete file download, breakpoint resume, thumbnail. In addition, iOS built-in AVPlayer, MPMoviePlayer provide a good HTTP support, for some demand only require playing, streaming media server don't need to transplant.

When Lighttpd is used as a Web Server, Lighttpd can satisfy the current functional requirements, with lower CPU utilization rate, less memory consumption. Compared with BOA and  thttpd, Lighttpd has better compatibility and stability.

# Web Server

Web Server doesn’t compile by default, users can enable it by change enable_web=yes in \config\package_config.sh. When video is used, system will auto-excute lighttpd -f /usr/local/etc/lighttpd.conf. \external\lighttpd\Lighttpd.conf is Lighttpd default configuration of Lighttpd, its core content is shown as follow.

```
server.port = 80
server.use-ipv6 = "disable"
server.document-root = "/mnt/sdcard/"
server.errorlog             = "/dev/null"
server.event-handler = "linux-sysepoll"
server.max-fds = 2048
server.stat-cache-engine = "simple"
server.max-connections = 1024
```

# VLC

VLC player is used on mobile terminal, it supports Windows, iOS, Android, Linux system, support all kinds of AV decoder and file format, media streaming protocols such as RTP, RTSP, RTMP and HTTP. For example, in iOS system, only need to  compile corresponding .framework program, and complete initialization. VLC will automatically broadcast according to URL.

```
NSString *cacheOption = [NSString stringWithFormat:@"--network-caching=0"];
NSArray* options = @[cacheOption];

VLCMediaPlayer *player = [[VLCMediaPlayer alloc] initWithOptions:options];
UIView * playerView = [[UIView alloc] init];
 [self.view addSubview:playerView];
 [player setDrawable:playerView];
 [player play];
```

# Q&A
# Thanks!

**Contact Us**
Building No.18, A District,
Fuzhou Software Park,
89 Soft Avenue, Tongpan Road,
Gulou District, Fuzhou, Fujian, China
P.C: 350003
TEL: 86-591-83991906 FAX: 86-591-83951833

Rockchip 瑞芯微电子