

AR1688 Based IP Phone Development Guide

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1 Program Structure

We provide software API for all AR1688 IP phone authorized manufacturers and end users. The API includes part of source codes and part of object files. Those source codes are provided under GPL license. Based on the API, users can make their own customized upgrade binary files for their IP phones. We do not provide fully open source software because we do not encourage those implementations to be transferred to another chip to compete with AR1688.

To understand the API better, I am going to list details and add explanations below. The API is provided as SDCC.rar file. It will decompress SDCC directory and files. We assume SDCC directory is decompressed to disk C:. If it is not, you will need to change the first line of sdcc\src\makefile.

AR1688 Program Directory

Currently there are following 6 directories under SDCC.

Bin Directory

The directory includes: SDCC open source compiler binary files and our own special tools binary files. We are using SDCC 2.7.0 steady version. You can also download those files directly from SDCC official website (<http://sdcc.sourceforge.net/>). The SDCC.exe is smaller than the official website one because we only compiled Z80 part in the .exe file. GNU make.exe utility is also here.

Doc Directory

.txt files. There are some illustrative files in this directory.

Include Directory

.h files. We only use SDCC compiler, do not use any include and library files from the official SDCC. All .h files are written by ourselves, there might be small difference of parameters compared with standard c runtime routines. And not all c runtime routines are included, only those needed are there. We are doing this for performance.

lib Directory

It is not actually "library" file, instead, there are object files in this directory, those object files are compiled from those source files which are not in API source code, and are to be linked together with other files in link stage. Same as "include", there are no standard SDCC library used in our project.

mcs51 Directory

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Although the IP phone reference design based on AR168M VOIP module and an external MCS8051 UI controller is for demo purpose, it actually can be used in real production and still maintain a very low BOM cost, because the MCS8051 we used is also very cost-effective. Here listing some details of the open source software in SDCC\mcs51.

1. Compile with open source SDCC compiler, using small memory mode.
2. Can NOT be upgraded by software on board, need a programmer to make change if needed.
3. Interface with 2x16 LCD, 8x6 keys and 4 LEDs.
4. Extra 4 LEDs if P4 port is available (on those Winbond devices we are testing).
5. Used 141 bytes of data and idata (means that we actually need a standard 8052 which has 256 bytes internal RAM).
6. Used 2797 bytes of code space, including extended ISO-8859-1 fonts for 2x16 LCD (a 4K ROM 8052 is enough, cost about 0.5 USD).
7. UART at 19200 bps, 8 bit data, 1 stop, no parity check.
8. Oscillator at 22.1184Mhz.

Src Directory

Open source files, including makefile and batch files to generate upgrade binary file. All UI related and VOIP protocol related implementations are provided in source code. Measured in source code size, over 80% are open source in this API.

Tool Directory

Full source code of those special tools in "bin" directory, in Visual Studio 2008 or MS Visual C++ 6.0 project.

AR1688 Program Structure

AR1688 series phones use Program Flash with 2M bytes. Details as follows:

```
structure, each page has 64k
page0 -- boot.bin and safemode.bin, ar168x_none_xx_XXXXXX.bin
page1 -- settings.dat, options, flags, digitmap and address book
page2 -- ring tone in g.711 u law, part 1
page3 -- ring tone in g.711 u law, part 2
page4 -- ring tone in g.711 u law, part 3
page5 -- hold music in g.711 u law, part 1
page6 -- hold music in g.711 u law, part 2
page7 -- hold music in g.711 u law, part 3
page8 -- GB font, part 1
page9 -- GB font, part 2
page10 -- GB font, part 3
```

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page11 -- GB font, part 4
page12 -- test_z80.bin and main.bin, ar168x_xxxx_xx_xxxxxx.bin
page13 -- bank 2&3
page14 -- bank 4&5
page15 -- bank 6&7
page16 -- http data
page17 -- G.711, G.726, GSM 6.10 and AEC DSP data
page18 -- G.729 DSP data
page19 -- iLBC DSP data
page20 -- reserved for DSP data
page21 -- reserved for DSP data
page22 -- copy 2 of test_z80.bin and main.bin, ar168x_xxxx_xx_xxxxxx.bin
page23 -- copy 2 of bank 2&3
page24 -- copy 2 of bank 4&5
page25 -- copy 2 of bank 6&7
page26 -- copy 2 of http data
page27 -- copy 2 G.711, G.726, GSM 6.10 and AEC DSP data
page28 -- copy 2 G.729 DSP data
page29 -- copy 2 iLBC DSP data
page30 -- copy 2 reserved for DSP data
page31 -- copy 2 reserved for DSP data

The Flash 2M memory space is divided into 32 pages of 64K each. The 32 pages are divided into 2 parts, page0 -- page11 and page12 -- page31.

page0 – page11

Each page is described as follows:

- page0: for safe-recovery function and start function;
- page1: for storing phone setting information and flag data and call rule data and phone book data;
- page2 -- page4: for storing phone ring data;
- page5 -- page7: for storing call hold music data;
- page8 -- page11: for storing font data;

The size of data in page1 is 64k. The data are divided into three parts, phone current settings data with 16K, default settings data with 16K and phone book data with 32k.

Phone setting data include flag bits, setting options and call rule data, whose filename is settings_xxx.dat; phone book includes 128 items presently, whose filename is phonebook.dat.

The size of ring tone data in page2 -- page4 must be 192K(3×64K), namely 196608 bytes, and the filename format is ringtone_xxx.dat, where xxx are any strings.

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The size of call hold music data in page5 -- page7 must be 192K(3×64K), namely 196608 bytes, and the filename format is holdmusic_xxx.dat, where xxx are any strings.

The size of font data in page8 -- page11 must be 256K(4×64K), and the filename format is font.dat.

page12 – page31

This part is for main program, protocol program, http data and DSP data.

page12 – page31 are divided into 2 parts with the same contents, which is a safety characteristic of the AR1688. page12 – page19 is section 1 and the data starts in page 12. page22 – page31 is section 2 and the data starts in page 22. We distinguish the two parts from each other by the configuration option “system_page”. When configured as “system_page=12”, the phone will boot from section 1 and let the phone program update the software in section 2. When it is set to “system_page=22”, the phone will boot from section 2 and let the phone update the software stored in section 1. By separating and duplicating the software, we avoid failures that could be caused by any errors that may occur while the program is updating.

The space for phone main program, http data and DSP data are 10 pages, namely 10×64K=640K, and the programs run in corresponding section according to flag setting. Pages of this part are as follows:

- page12 -- page15: phone main program;
- page16: for storing phone http data;
- page17 -- page21: for storing phone DSP data;
- page22 -- page25: the same as page12 -- page15.
- page26: the same as page16;
- page27 -- page31: the same as page17 -- page21;

Note:

Other pages are in development and reserved.

2 Program Compile

Compile Environment

Compile AR1688 with SDCC compiler. The configuration of compile path is in the file D:\sdcc\src\makefile and the configuration determines location of compiler and program. Makefile is as follows:

```
PATH_SDCC=C:\SDCC
```

Compiler and program directory SDCC are in disk C:, namely C:\SDCC, which is default setting.

Program File

The program file is a binary file and rules for a file name are

```
hardware_protocol_language_OEM_version.bin
```

Example: ar168x_sip_cn_oem_032000.bin.

“hardware”, “protocol”, “language” and “oem” correspond with parameters in mk command. For more details see the chapter about mk command.

“version” denotes the API program version that is defined in C:\sdcc\src\version.h, they are:

```
#define SOFT_VER_HIGH    0
#define SOFT_VER_LOW     3
#define SOFT_VER_BUILD   2
#define ENG_BUILD_HIGH   0
#define ENG_BUILD_MID    0
#define ENG_BUILD_LOW    0
```

The program file includes a safe-recovery mode program file and a phone update program file, as follows:

1) safe-recovery mode program file

The safe-recovery mode program file is the update file for page0. While parameter [protocol] in mk command is “none”, this file is created.

Note:

- Safe-mode program file is called page0 updating file for short in the later description.

- Compiling page0 is not supported by our provided API programs.

2) The file is for the program to upgrade phone.

The space for phone main program, http data and DSP data are 10 pages, namely $10 \times 64K = 640K$, and the program runs on page12-page21 or page21-page31. At present, 4 pages are for the main program, 1 page for http data and 5 pages for DSP data. So the size of updating program file is $10 \times 64K = 640K$. Details as follows:

- Main program: codes part of all functions for AR1688 series products;
- http data: files in src\res directory for web exploring, including multi-language;
- DSP data: all kinds of algorithm data, include PCMU, PCMA, G.726-32, GSM 6.10, G.729, iLBC and Speex;

Note:

- If there no http data and DSP data, programs for updating phone can't be created;
- Http data files include Chinese, English, French, Italian, Brazil, Spain, Romania, Russia and Turkey;
- Phone program file includes only one protocol. According to [protocol] parameter value to select protocol web configure file. [protocol]=SIP, import settings_sip.htm and [protocol]=IAX2, import settings_iax2.htm;

Compile Operation

Compile operation of AR1688 runs on DOS environment. Enter the directory C:\sdcc\src\, which includes compile (mk.bat) and clean (clean.bat) bat file, as follows:

mk.bat Batch File

mk.bat compiles source codes and produces program files. mk.bat calls reversion.exe, make.exe and namebin.exe commands to compile and produce programs. Above three commands are in the directory C:\sdcc\bin and will be described in chapter 4.

mk.bat syntax:

```
mk [hardware] [protocol] [language] [OEM] (Enter)
```

The 4 paramters are all defined in C:\sdcc\src\version.h.

- Hardware: the type for the phone, defined as VER_XXXX in version.h. The value for this parameter in mk command is "XXXX" that must be lowercase. In version.h, they are:

```
// General version config
//#define VER_AR168C
//#define VER_AR168D
//#define VER_AR168DS
```

```
//#define VER_AR168E
//#define VER_AR168F
//#define VER_GF302
//#define VER_YWH201
//#define VER_AR168G
//#define VER_GP1266
//#define VER_BT2008
//#define VER_QX900W
//#define VER_SENSOR
//#define VER_AR168I
//#define VER_AR168J
//#define VER_AR168K
//#define VER_GP2266
//#define VER_AR168L
//#define VER_AR168LS
//#define VER_AR168M
//#define VER_AR168MS
//#define VER_BT2008N
//#define VER_FWV2800
```

- Protocol: the protocol for the phone, defined as CALL_XXXX in version.h. The value for this parameter in mk command is “XXXX” that must be lowercase. In version.h, they are:

```
// Protocols
//#define CALL_H323
//#define CALL_SIP
//#define CALL_MGCP
//#define CALL_IAX2
//#define CALL_COMM           // for speech codec module
//#define CALL_NONE          // for safe-recovery mode
```

Note: CALL_NONE means creating an update file for page0.

- Language: the language for the phone, defined as RES_XX in version. The value for this parameter in mk command is “XX” that must be lowercase. In version.h, they are:

```
// Country and District
#define RES_CN
#define RES_US
```

.....

Note: "XX" are named according to

<http://www.iso.ch/iso/en/prods-services/iso3166ma/index.html>

- OEM: for special function, defined as OEM_XXXX in version.h. The value for this parameter in mk command is "XXXX" that must be lowercase. In version.h, they are:

```
// OEM defines
#define OEM_AAA
#define OEM_CCC
```

This parameter is not necessary when compiling if no special function is specified.

When [protocol] is "none", mk will compile page0 codes and create a page0 update file. When [protocol] are other values, mk compiles codes of phone main program and protocol parts and creates phone update program. Examples:

Example 1:

Compile ar168x phone, using page0 update file and Chinese. Command line:

```
C:\sdcc\src>mk ar168x none cn (Enter)
```

After compiling, ar168x_none_cn_032000.bin is created in src directory.

Example 2:

Compile ar168x phone, using IAX2 protocol, Chinese and specifying aaa for OEM. Command line:

```
C:\sdcc\src>mk ar168x iax2 cn aaa (Enter)
```

After compiling, phone upgrade program file, ar168x_iax2_cn_aaa_032000.bin is created in src directory.

Example 3:

Compile ar168x phone, using SIP protocol, English and no OEM. Command line:

```
C:\sdcc\src>mk ar168x sip us (Enter)
```

After compiling, phone upgrade program file, ar168x_sip_us_032000.bin is created in src directory.

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Note:

- Compiling page0 is not supported by our provided API programs.
- Default value for "language" is us. When using English and no OEM, language parameter can skip:

```
C:\sdcc\src>mk ar168x none (Enter)
```

After compiling, phone upgrade program file, ar168x_sip_us_032000.bin is created.

This mode is applicable in following compile.

When mk command is running, compile process information will show on DOS window. If there're errors in the program Error and Warning information will show.

clean.bat Batch File

clean.bat is to clear all compile results and its syntax: clean(Enter).

3 Update

Updating operation of AR1688 series phones supports TFTP and HTTP protocols.

Tftp Update

Enter DOS window and input tftp(enter), help information for this command displays.
Default directory is C:\SDCC\src

Tftp command syntax:

```
tftp [-i] host [get | put] source [destination]
```

”[]” denotes optional parameters. We explain parameters only for phone update operation:

- [-i]: indicates binary file mode. This mode must be chosen.
- Host: to update the phone IP.
- [get]: to read phone information and write to specified file.
- [put]: Write the data into the phone. Updating phone program, ring tone and setting information are all writing operation and this parameter is needed.
- Source: source binary file to be written, such as program file, other information file.
- [destination]: specified output destination file.

Update Program

Use parameter put to update a phone program. Command syntax:

```
tftp -i host put source (Enter)
```

“source” is a program file. For example:

Example1:

Update phone program, phone IP is 192.168.1.205 and program file is ar168x_iax2_cn_032000.bin. Command syntax as following:

```
C:\sdcc\src>tftp -i 192.168.1.205 put ar168x_iax2_cn_032000.bin (Enter)
```

Example2:

Update page0, phone IP is 192.168.1.205, program file is ar168x_iax2_cn_032000.bin. Command syntax:

```
C:\sdcc\src>tftp -i 192.168.1.205 put ar168x_iax2_cn_032000.bin (Enter)
```

Update Ring Tone

Use parameter put to update ring tone. Command syntax:

```
tftp -i host put source (Enter)
```

“source” is ring tone data file and the filename must begin with “ringtone_”, namely ringtone_xxx.dat. How to make this file will be described in chapter 4. For example:

Example:

Update ring tone. Phone IP is 192.168.1.205 and ring tone file is ringtone_aiya.dat, command line:

```
C:\sdcc\src>tftp -i 192.168.1.205 put ringtone_aiya.dat (Enter)
```

Update Call Hold Music

Use parameter put to update call hold music. Command syntax:

```
tftp -i host put source (Enter)
```

“source” is call hold music file and the filename must begin with “holdmusic_”, namely holdmusic_xxx.dat. How to make this file will be described in chapter 4. For example:

Example:

Update call hold music. Phone IP is 192.168.1.205 and call hold music file is holdmusic_aiya.dat, command line:

```
C:\sdcc\src>tftp -i 192.168.1.205 put holdmusic _aiya.dat (Enter)
```

Update Settings

Use parameter put to update phone settings. Command syntax:

```
tftp -i host put source (Enter)
```

“source” is phone settings file and the filename must begin with “settings_”, namely settings_xxx.dat. How to make this file will be described in chapter 4. For example:

Example:

Update phone settings information, phone IP is 192.168.1.205 and settings information file is settings_82378008.dat. Command syntax:

```
C:\sdcc\src>tftp -i 192.168.1.205 put settings_82378008.dat (Enter)
```

Read Phone Information

Use get parameter to read phone information and write it to specified file. Command syntax:

```
tftp -l host get destination (Enter).
```

To read different data, the file names specified by “destination” are respectively:

- Reading current settings information, “destination” is settings.dat;
- Reading phonebook data, “destination” is phonebook.dat;
- Reading data from some page, “destination” is pageX.dat, where “X” is a number from 0 to 31;

Example:

Phone IP is 192.168.1.205. Read settings information and save it to settings.dat.

Command syntax:

```
C:\sdcc\src>tftp -i 192.168.1.205 get settings.dat (Enter)
```

Note: DAT file read by tftp protocol can be converted to TXT file by convert command that will be described in chapter 4.

Note: reading and updating phone settings information, call rule data and phonebook data may use designated batch file, getopt.bat and setopt.bat, getpb.bat and setpb.bat (recommended). For more details see section 4.

HTTP Update

Enter phone setting WEB page, select update program item and open update program page, as follows:

Welcome To Upgrade Page

Firmware

Settings

Phone Book

Ring Tone

Call Hold Music

Upgrade File:

According to your request, choose the updating option and finish the updating operation. Updating operation in WEB page will be found in the AR1688 phone user guide. We show

some examples of updating files.

Firmware

Updating phone program files, such as ar168x_iax2_cn_032000.bin, can be found in chapter 2.

Settings

Settings file of the phone is a binary file(.dat). Steps of generating the file are:

1. use getopt.bat to get the settings.txt, for example:
getopt 192.168.1.200 (Enter)
2. Modify settings.txt and save it if necessary
3. Use convert command to convert a text file settings.txt to a binary file settings.dat.
Input:
convert -c settings.txt settings.dat (Enter)
4. Update the phone with settings.dat

Note:

Description of getopt.bat and convert.ext can be found in chapter 5.

Phonebook

Phonebook file is a binary file. Steps of generating it are:

1. Use getpb.bat to get phonebook.txt, for example:
getpb 192.168.1.200(Enter)
2. Modify phonebook.txt and save it if necessary
3. Use convert command to convert phonebook.txt to a binary file phonebook.dat, for example:
convert -p phonebook.txt phonebook.dat (Enter)
4. Update the phone with phonebook.dat

Note:

Description of getpb.bat and convert.ext can be found in chapter 5.

Ringtone File

It is a binary file for updating phone ring tone. Steps of generating it are:

1. Record a pcm ring by referencing chapter 6
2. Use convert command to convert ringtone.pcm to a binary file ringtone_alice.dat, for example:

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```
convert -r ringtone.pcm ringtone_alice.dat (Enter)
```

3. Update the phone with ringtone_alice.dat

Note:

Description of convert.ext can be found in chapter 5

Call Hold Music File

It is a binary file for updating call hold music. Steps of generating it are:

1. Record a pcm ring by referencing chapter 6
2. Use convert command to convert holdmusic.pcm to a binary file holdmusic_alice.dat, for example:

```
convert -r holdmusic.pcm holdmusic_alice.dat (Enter)
```
3. Update the phone with holdmusic_alice.dat

Note:

Description of convert.ext can be found in chapter 5

4 Debug

Debug comprises checking date and debugging phone simply.

How To Enter Safe Mode

Press "*" key while the phone is powered. The phone enter safe mode and phone IP is **192.168.1.200**. LCD on the phone display "Safe Mode". The address is a default IP address, configuration of which is in C:\sdcc\src\sys.c that includes other default configuration, as followings:

```
const UCHAR _pDefaultMacAddress[HW_ALEN] = {0x00, 0x18, 0x1f, 0x00, 0x00,
0x00};
const UCHAR _pDefaultIpAddress[IP_ALEN] = {192, 168, 1, 200};
const UCHAR _pDefaultSubnetMask[IP_ALEN] = {255, 255, 255, 0};
const UCHAR _pDefaultRouterIp[IP_ALEN] = {192, 168, 1, 1};
```

Check Date Information

We check phone date information in Palmtool debug window. Run palmtool.exe and input phone IP in "chip IP address" in main window of Palmtool. Click "start debug" and debug window pops up. In this window, operation information for phone, such as keyboard operation, state of phone updating and so on, is displayed.

Test In Safe Mode

The phone enter safe mode. Test in safe mode:

- Press "#3*0" test g711.dat DSP_OP_TEST_ENCODE & DSP_OP_TEST_DECODE.
- Press "#6*X" combination to run voice encode test.
 - X = 0: start simulating self-test;
 - X = 1: stop simulating self-test;
 - X = 2: start 8K sampling digital self-test;
 - X = 3: stop 8K sampling digital self-test;
 - X = 4: start speaker mode, 8K sampling digital self-test. Stopping test is "#6*3".
- Press "#9*0" combination to restart the phone.

5 Command And Batch File

C:\sdcc\bin includes application program commands and batch files. Here we explain phone operation contents.

Convert.exe Command

Convert files from one format to another.

Command Format

Convert command syntax:

```
convert [[-c|--cfg2bin] | [-C|--bin2cfg] | [-w|--web2web] | [-i|--web2info] | [[-h|--bin2h]
[-a<0-65535>] [-l<0-65535>]] | [-r|--ring2bin] | [-p|--pb2bin] | [-P|--bin2pb]] [-f|--force]
srcFile dstFile
```

- [-c|--cfg2bin]: "c" in -c must be lowercase, Convert configuration text file to binary file;
- [-C|--bin2cfg]: "C" in -C must be uppercase, Convert configuration binary file to text file;
- [-w|--web2web]: Convert html file to AR1688 acceptable html format;
- [-i|--web2info]: Read parameters in the web page and convert it to a header file.
- [-h|--bin2h]: Convert a file to a c headfile;
- [-r|--ring2bin]: Convert pcm ring file to AR1688 acceptable binary file.
- [-p|--pb2bin]: "p" in -p must be lowercase, convert phonebook text file to binary file.
- [-P|--bin2pb]: "P" in -P must be uppercase, convert phonebook binary file to text file.
- [-f|--force]: Force to overwrite the destination file that exists;
- srcFile: Specifies the source files to be converted;
- dstFile: Specifies the destination file;

Input "convert (Enter)", help information will be displayed.

Command Operation

According to different option, we explain the converting process respectively.

- **-c | --cfg2bin**

Convert the phone configuration text file (txt) to binary file (dat).

Command syntax:

```
convert -c srcFile dstFile (Enter)
```

or:

```
convert --cfg2bin srcFile dstFile(Enter)
```

"srcFile" is phone configuration text file to be converted and "dstFile" is specified

output data file. For example:

Example:

Convert the phone configuration text file C:\sdcc\src\settings_iax2.txt to data file settings_iax2.dat.

```
C:\sdcc\src>..\bin\convert -c settings_iax2.txt settings_iax2.dat (Enter)
```

or:

```
C:\sdcc\src>..\bin\convert --cfg2bin settings_iax2.txt settings_iax2.dat (Enter)
```

After above operation completes, settings_iax2.dat is created in C:\sdcc\src.

- **-C | --bin2cfg**

Convert the phone configuration binary file (dat) to text file (txt).

Command syntax:

```
convert -C srcFile dstFile (Enter).
```

or:

```
convert --bin2cfg srcFile dstFile (Enter)
```

SrcFile is a configuration data file to be converted and dstFile is a specified output text file converted. For example:

Example:

Convert the phone configuration binary file C:\sdcc\src\settings_iax2.dat to text file settings_iax2.txt.

```
C:\sdcc\src>..\bin\convert -C settings.dat settings_201.txt (Enter)
```

or:

```
C:\sdcc\src>..\bin\convert --bin2cfg settings_iax2.dat settings_iax2.txt (Enter)
```

After above operation completes, settings_iax2.txt is created in D:\sdcc\src.

- **-w | --web2web**

Convert the html file to AR1688 acceptable html format.

Command syntax:

```
convert -w srcFile dstFile (Enter)
```

or:

```
convert --web2web srcFile dstFile (Enter)
```

SrcFile is a html file to be converted and dstFile is a specified output html file converted. For example:

Example:

Convert the html file login.htm to web_login.html

```
C:\sdcc\web>..\bin\convert -w login.htm web_login.htm (Enter)
```

Or input:

```
C:\sdcc\web>..\bin\convert --web2web login.htm web_login.htm (Enter)
```

After above operation completes, web_temp.htm is created in C:\sdcc\web.

- **-i | --web2info**

Inquire about parameters of phone parameter setting Web page and write the flag in the program corresponding to the parameters to the header file (.h).

Command input:

```
convert -i srcFile dstFile (Enter)
```

or:

```
convert --web2info srcFile dstFile (Enter)
```

srcFile is a source html file, and dstFile is an output header file. For example:

Example:

Convert a html file settings.htm to a header file web_info.h.

```
C:\sdcc\web>..\bin\convert -i settings.htm web_info.h(Enter)
```

Or input

```
C:\sdcc\web>..\bin\convert --web2info settings.htm web_info.h(Enter)
```

After above operation, web_info.h is created in C:\sdcc\web directory.

- **-h | --bin2h**

Convert a file to a c head file (.h).

Command syntax:

```
convert -h srcFile dstFile (Enter)
```

or:

```
convert --bin2h srcFile dstFile (Enter)
```

SrcFile is a binary file to be converted and dstFile is a specified output c head file converted. For example:

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Example 1:

Convert the html file login.htm to a c head file web_login.h.

```
C:\sdcc\settings>..\bin\convert -h login.htm web_login.h (Enter)
```

Or input:

```
C:\sdcc\settings>..\bin\convert --bin2h login.htm web_login.h (Enter)
```

After above operation completes, web_login.h is created in C:\sdcc\settings.

Example 2:

Convert the phone configuration text file iax2.txt to a c head file settings_iax2.h.

```
C:\sdcc\settings>..\bin\convert -h iax2.txt settings_iax2.h (Enter)
```

Or input:

```
C:\sdcc\settings>..\bin\convert --bin2h iax2.txt settings_iax2.h (Enter)
```

After above operation completes, settings_iax2.h is created in C:\sdcc\settings.

- **-r | --ring2bin**

Cut the recorded music file to the size permitted by AR1688 and save as a binary file(bin)

Command syntax:

```
convert -r srcFile dstFile (Enter)
```

Or:

```
convert --ring2bin srcFile dstFile (Enter)
```

srcFile is a music file to be converted, and dstFile is an output binary file converted.

For example:

Exempl:

Convert music file stdring.pcm to ringtone.bin.

```
C:\sdcc\src>..\bin\convert -r stdring.pcm ringtone.dat(Enter)
```

Or input

```
C:\sdcc\src>..\bin\convert --ring2bin stdring.pcm ringtone.dat (Enter)
```

After above operation, binary file ringtone.dat is created in C:\sdcc\settings directory.

- **-p | --pb2bin**

Convert the phonebook text file (txt) to binary file (dat).

Command syntax:

convert -p srcFile dstFile (Enter).

or:

convert --pb2bin srcFile dstFile(Enter)

SrcFile is phonebook text file to be converted and dstFile is specified output data file.

For example:

Example:

Convert the phonebook text file d:\sdcc\src\phonebook.txt to data file phonebook.dat.

```
C:\sdcc\src>..\bin\convert -p phonebook.txt phonebook.dat (Enter)
```

Or input:

```
C:\sdcc\src>..\bin\convert --pb2bin phonebook.txt phonebook.dat (Enter)
```

After above operation completes, phonebook.dat is created in C:\sdcc\bin.

- **-P | --bin2pb**

Convert the phonebook binary file (dat) to text file (txt).

Command syntax:

convert -P srcFile dstFile (Enter).

or:

convert --bin2pb srcFile dstFile (Enter)

SrcFile is a phonebook data file to be converted and dstFile is a specified output text file converted. For example:

Example:

Convert the phonebook binary file d:\sdcc\src\ phonebook.dat to text file phonebook.txt.

```
C:\sdcc\src>..\bin\convert -P phonebook.dat phonebook.txt (Enter)
```

Or input:

```
C:\sdcc\src>..\bin\convert --bin2pb phonebook.dat phonebook.txt (Enter)
```

After above operation completes, phonebook.txt is created in C:\sdcc\bin.

- **-f | --force**

Overwrite an existing file with this attribution.

With [-f|--force] in the command line, if an output file (dstFile) has existed in the directory the file will be overwritten.

Without [-f|--force] in the command line, if an output file (dstFile) has existed in the

directory the followings will display:

The destination file exists. Overwrite the file?(Yes/No):

Input “y|ye|yes” and overwrite an existing destination file. Input “n|no”, exit convert command and don't overwrite an existing file.

Example:

```
C:\sdcc\settings>..\bin\convert -c -f settings_iax2.txt settings_iax2.dat(Enter)
```

Or input:

```
C:\sdcc\settings>..\bin\convert -c --force settings_iax2.txt settings_iax2.dat (Enter)
```

If settings_iax2.dat has existed, settings_iax2.dat will be overwritten after inputting above command line.

getopt.bat and setopt.bat

getopt.bat batch file: Read phone configuration and digit maps, and output it in a text file “options.txt”. Syntax:

```
getopt [IP address]
```

setopt.bat batch file: write the configure and digit maps text file options.txt to the phone, Syntax:

```
setopt [IP address]
```

[IP address] is the phone IP address. getopt.bat and setopt.bat are used together, and after running setopt.bat, options.txt will be deleted automatically. For example:

Example:

1) Input

```
C:\sdcc\bin>getopt 192.168.1.205 (Enter)
```

Read phone configure and digit maps of IP 192.168.1.205 and write it to options.txt, that includes all phone configure and digit maps information;

2) According to demands modify information in options.txt and save them;

3) Input

```
C:\sdcc\bin>setopt 192.168.1.205 (Enter)
```

Write options.txt to a phone and the phone will restart.

File options.txt include 2 different section of [settings] and [digitmap]. Phone configure listed under [settings]. Digit maps listed under [digitmap].

getpb.bat and setpb.bat

getpb.bat: read phone book information and put them into a text file phonebook.txt. The command syntax:

```
getpb [IP address]
```

setpb.bat: write the file phonebook.txt to the phone. The command syntax:

```
setpb [IP address]
```

“IP address” is the phone IP address. After setpb.bat is run, the phonebook.txt created by getpb.bat will be deleted. For example:

Example:

1) Input:

```
C:\sdcc\bin>getpb 192.168.1.205 (enter)
```

Read the phonebook information of the phone with IP 192.168.1.205 and write it to phonebook.txt;

2) If necessary, modify the phonebook.txt and save it;

3) Input:

```
C:\sdcc\bin>setpb 192.168.1.205 (enter)
```

Write the phonebook.txt to the phone and phone restarts.

Contents of phonebook.txt as follows:

```
pb_name001=support1
pb_number001=01082378008
pb_name002=support2
pb_number002=01082378009
pb_name003=support3
pb_number003=01082568888
pb_name004=support4
pb_number004=01082011111
```

Phonebook.txt includes phonebook data information, total 100 items and only valid items displayed are in the file. “pb_name” stands for the name property of the phonebook and “pb_number” stands for the number property of the phonebook, detail information is after “_”.

For example:

“pb_name001 = support1 pb_number001 = 01088365621”: the first item in the phonebook, the name is support1 and the number is 01088365621.

6 Create Music File

Music file, including phone ringtone file and call hold music file, is a binary file and can be updated to a phone. Phone ringtone file is stored in page2-page4 and call hold file in page5-page7, each part is 192K(3×64K).

Tone is sampled at 8k points per second and compressed by 8-bit mu law with 1 Byte per sample point. We set 32768 Bytes (32K) as a section and use 32640Bytes of them; the last 128Bytes are not used. So, 4.08 seconds music can be stored in one section. The size of a music file is 196608Bytes (6×32768Bytes) and the music stored in it can plays $6 \times 4.08 = 24.48$ seconds.


Warning:

The size of music file must be 196608 Bytes. If not, errors will take place.

Record Music

Use CoolEdit to record music, here take example for Cool Edit Pro Version 2.1.


Set recording control property:

1. Click PC volume property ;
2. Point "property" on "options" menu and click it;
3. Select "record" in "adjust volume";
4. Select all volume control in "display volume control" and click "OK";
5. Select "wave output balance" only and exit;

Use CollEdit to record:

1. Run CoolEdit.exe;
2. Point "New" on "File" menu and click it;
3. Select "8000" in "Sample Rate", "Mono" in "Channels", "8-bit" in "resolution" and click "OK".;
4. Point "Show Transport Buttons" on "View" menu and select it. The following controllers display at the down-left corner:



5. Open player "Windows Media Player";
6. Point "Transport Buttons" and click the record button ;
7. Time for record ring tone is 24.48 seconds;
8. Point "Save As..." on "File" menu and click it;
9. Click "Options":

10. Select "8-bit mu-Law Compressed" in "Data Formatted As";
11. Select "PCM Raw Data (*.pcm, *.raw)" in "Save Type";
12. Input filename and click "Save";

Cut Music File

Music file updated to a phone must be a binary data file. After recording music, use convert command to cut a music file(.pcm) to 196608Bytes and save as a binary data file.

Input command format:

```
Convert -r|--ring2bin srcFile dstFile(Enter)
```

See convert command section in Chapter 5 for more details.

Update Music File

Music Files include ring tone and call hold music. These file are named according to the file naming principle, namely ringtone_xxx.dat and holdmusic_xxx.dat. Then copy the music file to D:\sdcc\src, and use tftp command to update the phone. Tftp command and convert command have been described in previous chapter and updating ring tone process as follows.

Example 1, Update ring tone file:

1. record a music file alice.pcm;
2. use convert command to cut the music file and convert it to binary data file;
C:\sdcc\bin>convert -r alice.pcm ringtone_alice.dat(Enter)
3. copy ringtone_alice.dat to sdcc\src;
4. enter DOS window and input following commands in sdcc\src directory:
tftp -i 192.168.1.205 put ringtone_alice.dat (Enter)
"192.168.1.205" is phone IP address.

Example 2, Update call hold music file:

5. record a music file alice.pcm;
6. use convert command to cut the music file and convert it to binary data file;
C:\sdcc\bin>convert -r alice.pcm holdmusic_alice.dat(Enter)
7. copy holdmusic_alice.dat to sdcc\src;
8. enter DOS window and input following commands in sdcc\src directory:
tftp -i 192.168.1.205 put holdmusic_alice.dat (Enter)
"192.168.1.205" is phone IP address.

Do Not Upgrade “Long” Ring Tone

Don't upgrade a ring tone more than 192K bytes.

1. AR1688 ring tone is located in bank 2, 3, 4, total 192k bytes; AR1688 hold music is located in bank 5, 6, 7, the format and size is the same as ring tone.
2. AR1688 font used in dot-matrix display designs (AR168G/GP1260/GP1266/GP2266) is located in bank 8, 9, 10, 11
3. When using TFTP to upgrade ring tone and hold music, we will not check file length. This is a back door for us to upgrade font, because there is no special way to upgrade font
4. A ring tone more than 192k bytes will replace hold music. A long ring tone more than 384k bytes will replace font and make dot-matrix display wrong. And a very long ring tone more than 640k bytes will destroy software program space (page 12 - 31) and make the IP phone fail to boot normally, lucky enough, safe mode in page 0 will not be replaced, the phone can still get into safe mode upgrade correct files again.

7 HTTP Auto-Provisioning

Settings file and firmware file

Preparing settings file

Prepare the settings file named [MAC].txt in the upgrade server. [MAC] is MAC address of the phone to be upgraded, such as 00-18-1f-01-00-3a.txt. a settings file can be created by getopt.bat command and for more details see getopt section in chapter 5. A settings file example:

```
config_id=0008    (as a flag for settings file)

mac_address=0x00,0x18,0x1f,0x01,0x00,0x3a

.....

provision_server=192.168.1.251

provision_port=8080

provision_ttl=60

prov_filename=ar168x_iax2_cn_032000.bin (for setting a file name for upgrading the
firmware)

.....

digit_dialing=0
```

Preparing firmware file

Save the firmware file for upgrading in the server. Rule of name is

```
hardware_protocol_language_version.bin
```

such as ar168x_iax2_cn_032000.bin. Using mk to compile the phone program, producing the firmware upgrading file. For more details see mk section in chapter 3.

Set server address and port

Please choose the keyboard or WEB orders and set Auto-provisioning server address and server port. For more details see phone user guide in chapter 5.1.7 or 5.2.5.

Auto-upgrade settings file and firmware file

After the properly setting phone starts, it will get the settings file from the upgrade server. If onfig_id in the settings file is different from the one in the phone, the phone will be updated with all the parameters in the file.

After setting parameters, the phone will restart to make the parameter valid. If prov_filename item in new parameters is different from the firmware filename in the phone, the phone will connect with the server to get the firmware file and update automatically.

When “auto-upgrade interval” in the phone settings expires, the phone will connect with the server to get [MAC].txt automatically. If config_id is the same with the one in the phone, it will stand by.

8 How To Modify WEB Page

It's not recommended that modifying the phonebook, digitmap and updating program page. The following shows how to modify the parameters information page.

Programs directories and files related with WEB page:

- SDCC\src\res\us (WEB page displays English)
- SDCC\tool\convert\web.cpp
- SDCC\include\web_info_iax2.h, web_info_sip.h
- SDCC\src\http.c, settings.c

Note:

The English pages are default standard WEB page. We take English pages as a template.

mkweb.bat and mkweball.bat

There are two bat files in SDCC\src\res\, mkweb.bat and mkweball.bat, that convert web page easily. As follows:

mkweb.bat

Input format:

```
mkweb [protocol] (Enter)
```

For the converting operation of the phone setting page. After modifying settings_iax2.htm or settings_sip.htm, run mkweb.bat, converting .htm file to html file accepted by AR1688 and generating web_info_iax2.h and web_info_sip.h in SDCC\include\.

Note:

We convert web_info_iax2.h and web_info_sip.h according to the English setting page.

Details in mkweb.bat codes:

```
IF "%1"=="sip" GOTO Do_sip
```

```
GOTO Do_iax2
```

```
:Do_sip
```

```
..\bin\convert -w -f us\settings_sip.htm settings_sip_us.htm
```

```
..\bin\convert -w -f cn\settings_sip.htm settings_sip_cn.htm
```

```
..\bin\convert -i -f us\settings_sip.htm ..\include\web_info_sip.h
```

GOTO End

:Do_iax2

```
..\bin\convert -w -f us\settings_iax2.htm settings_iax2_us.htm
```

```
..\bin\convert -w -f cn\settings_iax2.htm settings_iax2_cn.htm
```

```
..\bin\convert -i -f us\settings_iax2.htm ..\include\web_info_iax2.h
```

:End

If not, mkweb.bat should be modified.

mkweball.bat

Input format:

```
mkwebball [language] (Enter)
```

For all converting operation of WEB page. After modifying WEB page files, run mkweball.bat, converting all .htm files to html files accepted by AR 1688 and saving them in a temporary directory. Overwrite the old files with new files in the temporary directory.

Modify Language

Standard WEB pages display English, whose codes directory is:

```
SDCC\src\res\us
```

We translate English pages into French (ab.fr). As following:

Step 1. Translate all .htm files in \res\us\ and save them in a new directory \res\fr\;

Step 2. Translate the 3 .h files in \res\us\ into your native language and save them in a new directory \res\fr\. The files for 2×16 char LCD which does not support accented characters, like é è ç à ê ô;

Step 3. Translate full version with accented characters into files named menu_dot.h, str_dot.h and time_dot.h for dot-metric display;

Step 4. Modify the mkweball.bat file to deal with files in \res\fr\ directory. Contents in mkweball.bat:

```
IF "%1"=="cn" GOTO Do_cn
```

```
GOTO Do_us
```

```
:Do_cn
```

```
md temp_cn
```

```
..\bin\convert -w -f cn\abort.htm temp_cn\abort.htm
```

```
..\bin\convert -w -f cn\failure.htm temp_cn\failure.htm
```

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```
..\bin\convert -w -f cn\login.htm temp_cn\login.htm
..\bin\convert -w -f cn\phonebook_head.htm temp_cn\phonebook_head.htm
..\bin\convert -w -f cn\phonebook_tail.htm temp_cn\phonebook_tail.htm
..\bin\convert -w -f cn\settings_iax2.htm temp_cn\settings_iax2.htm
..\bin\convert -w -f cn\settings_sip.htm temp_cn\settings_sip.htm
..\bin\convert -w -f cn\success.htm temp_cn\success.htm
..\bin\convert -w -f cn\upgrade.htm temp_cn\upgrade.htm
GOTO End
```

```
:Do_us
md temp_us
..\bin\convert -w -f us\abort.htm temp_us\abort.htm
..\bin\convert -w -f us\failure.htm temp_us\failure.htm
..\bin\convert -w -f us\login.htm temp_us\login.htm
..\bin\convert -w -f us\phonebook_head.htm temp_us\phonebook_head.htm
..\bin\convert -w -f us\phonebook_tail.htm temp_us\phonebook_tail.htm
..\bin\convert -w -f us\settings_iax2.htm temp_us\settings_iax2.htm
..\bin\convert -w -f us\settings_sip.htm temp_us\settings_sip.htm
..\bin\convert -w -f us\success.htm temp_us\success.htm
..\bin\convert -w -f us\upgrade.htm temp_us\upgrade.htm
```

```
:End
```

We add followings to deal with French(fr), as following:

```
IF "%1"=="cn" GOTO Do_cn
IF "%1"=="fr" GOTO Do_fr
GOTO Do_us
```

```
:Do_cn
.....
.....
GOTO End
```

```
:Do_fr
md temp_fr
..\bin\convert -w -f fr\abort.htm temp_fr\abort.htm
..\bin\convert -w -f fr\failure.htm temp_fr\failure.htm
..\bin\convert -w -f fr\login.htm temp_fr\login.htm
..\bin\convert -w -f fr\phonebook_head.htm temp_fr\phonebook_head.htm
..\bin\convert -w -f fr\phonebook_tail.htm temp_fr\phonebook_tail.htm
```

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```
..\bin\convert -w -f fr\settings_iax2.htm temp_fr\settings_iax2.htm  
..\bin\convert -w -f fr\settings_sip.htm temp_fr\settings_sip.htm  
..\bin\convert -w -f fr\success.htm temp_fr\success.htm  
..\bin\convert -w -f fr\upgrade.htm temp_fr\upgrade.htm  
GOTO End
```

```
:Do_us  
md temp_us  
.....  
.....  
..\bin\convert -w -f web_us\upgrade.htm temp_us\upgrade.htm  
  
:End
```

Step 5. Input command line mkweball fr(Enter), convert all files in \res\fr\ directory to html files accepted by AR1688 and save them in a temporary directory \res\temp_fr\;

Step 6. Overwrite files in \res\fr\ with files in \res\temp_fr\;

Step 7. Recompile the phone program with mk.bat and choose French, for example, mk ar168f iax2 fr;

Step 8. Update the phone and French page is valid;

Note:

If you feel difficult for above operation, you can do step 1, 2, 3 and send files to support@aredfox.com. We can complete modifying codes.

Modify Page Layout

Standard WEB pages display English, whose codes directory is:

```
SDCC\src\res\us
```

We take the English page as a template, as follows:

Step 1. According to request of clients, modify files in the directory \res\us\, such as WEB page layout, picture display and so on. But modifying filename is not permitted;

Step 2. Input command line mkweball us(Enter), convert all files in \res\us\ to html files accepted by AR1688 and save them in temporary directory \res\temp_us\;

Step 3. Overwrite files in \res\us\ with files in \res\temp_us\;

Step 4. Recompile the phone program with mk.bat;

Step 5. Update the phone and the new WEB is valid;

Delete Option

English standard settings page include SIP protocol and IAX2 protocol, whose file respectively is:

- SDCC\src\res\us\settings_sip.htm
- SDCC\src\res\us\settings_iax2.htm

We take IAX2 protocol page for example, deleting a phone option, as follows:

Step 1. Open the source code file of settings_iax2.htm and delete “IAX2 Server Port” (IAX2 server port) option part codes. Codes in settings_iax2.htm are as follows:

```
.....  
<tr>  
<td>IAX2 server port:</td>  
<td>  
<INPUT name=iax2_port size=5 maxlength=5>(default 4569)  
</td>  
</tr>  
.....
```

Delete above codes and save the file;

Step 2. Input command line `mkweb iax2(Enter)`, convert settings_iax2.htm in \res\us\ to a html file accepted by AR1688 and generate a new file settings_iax2.htm in res directory;

Step 3. While doing step2, generate a new web_info_iax2.h in SDCC\include directory;

Step 4. Overwrite settings_iax2.htm with the new one.

Step 5. Recompile the phone program with mk.bat;

Step 6. Update the phone and the new WEB page is valid.

9 How To Add Regional and Language

With PA1688, we have supported over 30 different language firmware. None of us understand language except Chinese and English, volunteers all over the world helped us to do the entire localization works. I believe that we can do this again with AR1688, hopefully even better because it is well planned from the beginning.

From 0.10 firmware, we have finalized all UI implementations. Of course we will continue to improve it and fix bugs, however, developers can do regional and language customization based on this version without worrying future huge changes.

Based on 0.32.000 software API, please following steps below to add your own native language support:

- Step1. Starting from SDCC\inc\version.h, find the RES_XX sections, check if your regional code is in the list or not. The 'XX' code is following ISO 3166 (<http://www.iso.ch/iso/en/prods-services/iso3166ma/index.html>). If it already exists, you can jump to step 3 directly. If it is not, please add it. You can then choose to move on to next step, or send an email to support@aredfox.com, tell us about your change, and ask us to do step 2, you can jump to step 3.
- Step2. Add your regional DTMF frequency and interval to SDCC\src\dtmf.c, search for "RES_US" in files if you need guide for changes. See the section in Chapter 8 for more details.
- Step3. Translate the English web pages in SDCC\src\res\us into your native language, put them in the new SDCC\src\res\xx directory.
- Step4. Translate SDCC\src\res\us\menu.h, time.h and str.h into your native language, keep the original coding as it is in the file. For example, keep ISO-8859-1 coding for French special chars and ISO-8859-9 coding for Turkish special chars.
- Step5. In SDCC\src\time.c, add judging your regional code and judging accented characters, change time and date display format accordingly, and add day light saving time support if your region uses day light saving. China does not use day light saving today. Currently only USA day light saving is implemented. Make sure "Automatically Adjust Clock for Daylight Saving Changes" option is checked in settings. If you need guide for change, search for other language in files, or send request to support@aredfox.com.
- Step6. Add judging your regional code and judging accented characters to SDCC\src\ui_str.c. If you need guide for change, search for other language in files, or send an email to support@aredfox.com. With 2x16 LCD, the display will still be English, but we can add other language font display with dot-matrix LCD.
- Step7. Add necessary ISO-8859-X font in SDCC\src\font.c, or update Unicode font in the 256k bytes font data flash storage space.
- Step8. find SDCC\src\res\us\inputmap.h, change it to your own native language.

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SDCC\src\res\ro\inputmap.h is Romanian example and SDCC\src\res\ru\inputmap.h is Russian example. Different inputmap.h is included with RES_XX define in SDCC\src\menu.c.

For users with less programming experience, only step 3, 4 and 5 are necessary, we will do the other works after we have received the translations for step 3, 4 and 5.

10 How To Change MAC Address

The MAC address of PA1688 based device can be easily changed by Palmtree, and we spent a lot of technical support effort to help manufacturers and end users to get rid of the duplicated MAC problem. When we began to design AR1688 software, we tried to avoid the problem from the beginning, the MAC address is not allowed to be changed in most situations. But still there is request of MAC address changing request that we feel not easy to refuse, the result is this guide.

However, this is not a simple guide, and you must be an advanced user to follow this guide. If you do not know how to upgrade by TFTP, do not know how to enter safe-mode, or do not know what MAC address is, you can skip the rest.

1. Make sure you have most recent AR1688 API in hand, feel free to write to support@palmmicro.com.cn for a copy if you do not have it.
2. Also write to support@palmmicro.com.cn saying that you need special firmware to change your MAC address. Please provide information like hardware type, protocol and language for us to send you the correct firmware.
3. Press * while power up to set your AR1688 IP phone into safe-mode.
4. Use the command line tool in API SDCC\bin, "getopt 192.168.1.200", when it finishes, an options.txt file will pop up.
5. In options.txt, find the line like "mac_address=0x00,0x18,0x1f,0x10,0xa0,0xb8", change whatever MAC address you like to use.
6. Save options.txt, use "setopt 192.168.1.200", the phone will reboot after change
7. Use command line to upgrade the special firmware we sent in email in step 2, usually like "tftp -i xxx.xxx.xxx.xxx put ar168x_sip_us_032000.bin". The file is 640k in size.
8. Use command line to upgrade the safe-mode firmware we sent in email in step2, usually like "tftp -i xxx.xxx.xxx.xxx put ar168x_none_us_032000.bin", the file is 64k in size.

After those steps, you can use and upgrade normal firmware in the future with MAC address changed.

11 Manager Tool

Manager.exe can manage AR1688 easily, such as upgrading, updating, debug and so on. AR1688 user can look AR1688 information with PalmTool no longer.

Run C:\sdcc\bin\manager.exe and pop manage tool with the interface divided into two parts, phone display and controller operation. The part of phone display lists all phones to be managed.

Note: because of limitation of directory manager.exe exists in C:\sdcc\bin\.

Setting phone

Before using Manager, set Syslog IP parameters. There are 3 cases:

1. Syslog IP is set as 0.0.0.0 and the phone is not displayed in Manager;
2. Syslog IP is set as 255.255.255.255 and the phone is displayed in Manager, but manage tool IP is not set;
3. Syslog IP is set as the same as the PC, which Manager runs on. Phone send message to the IP and the message is displayed in Manager of the PC.

Examples:

Phone 1 Syslog IP is 0.0.0.0;
Phone 2 Syslog IP is 255.255.255.255;
Phone 3 Syslog IP is 192.168.1.121
Run Manager on the PC with IP 192.168.1.121;
Run Manager on the PC with IP 192.168.1.125;

Phone 2 and phone 3 are displayed in Manager1 and phone 2 is displayed in Manager2.

Note:

- Syslog IP parameter is in the system parameter part;
- Phone sends login message at every one minute and so wait for a while after open Manager;

Other Function

Update Program

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Update phone upgrading programs. In the phone display list, select the phone to be updated and click “Upgrade Program” controller, and then select proper programs to update the phone. Phones can be selected at the same time but they must be the same type.

Read/Write Phone Settings

Read setting information of a selected phone and output it to a txt file. Select a phone in the phone list and click “Get Options” controller, read phone settings and display in option.txt. Select one phone at each time.

Write phone setting information. Select a phone in the list and click “Set Options” controller, select a setting information text file to update. More phones can be selected at the same time.

Read/Write PhoneBook

Read phonebook information of a selected phone and output it to a txt file. Select a phone in the phone list and click “Get Phonebook” controller, read phone settings and display in phonebook.txt. Select one phone at each time.

Write phonebook information. Select a phone in the list and click “Set Phonebook” controller, select a phonebook information text file to update. More phones can be selected at the same time.

Debug Function

With debug window explore all kinds of messages of AR1688. Click “Start Debug” controller and pop debug window. Explore different phone information according to debug options.

More details as follows:

- Broadcast Debug: Output phone broadcast package information
 - Syslog Debug: Output phone Syslog message
1. Without selecting “Broadcast Debug” and “Syslog Debug” or whit selecting “Broadcast Debug” and “Syslog Debug”, debug window displays the phone broadcast package information and Syslog information;
 2. With selecting “Broadcast Debug” and not “Syslog Debug”, debug window displays the phone broadcast package information only;
 3. With selecting “Syslog Debug” and not “Broadcast Debug”, debug window displays

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- the phone Syslog information only;
4. With selecting a phone in the list, debug window displays the phone message only;

Note:

- Click “Start Debug” controller and pop debug window, the text on the controller will change to “Stop Debug”. Click “Stop debug” and the debug window close.