I.MX Platform Advanced Toolkit Reference Manual

Version 1.68
6/2009

How to Reach Us:

Home Page:
www.freescale.com

E-mail:
support@freescale.com

USA/Europe or Locations Not Listed:
Freescale Semiconductor
Technical Information Center, CH370
1300 N. Alma School Road
Chandler, Arizona 85224
+1-800-521-6274 or +1-480-768-2130
support@freescale.com

Europe, Middle East, and Africa:
Freescale Halbleiter Deutschland GmbH
Technical Information Center
Schatzbogen 7
81829 Muenchen, Germany
+44 1296 380 456 (English)
+46 8 52200080 (English)
+49 89 92103 559 (German)
+33 1 69 35 48 48 (French)
support@freescale.com

Japan:
Freescale Semiconductor Japan Ltd.
Headquarters
ARCO Tower 15F
1-8-1, Shimo-Meguro, Meguro-ku,
Tokyo 153-0064, Japan
0120 191014 or +81 3 5437 9125
support.japan@freescale.com

Asia/Pacific:
Freescale Semiconductor China Ltd.
Exchange Building 23F, No. 118 Jianguo Road
Chaoyang District
Beijing 100022, China
+86 010 5879 8000
support.asia@freescale.com

***For Literature Requests Only*:**
Freescale Semiconductor Literature Distribution Center
P.O. Box 5405
Denver, Colorado 80217
1-800-521-6274 or 303-675-2140
Fax: 303-675-2150
LDCForFreescaleSemiconductor@hibbertgroup.com

Contents

About This Book

This guide describes the integration environment of the Advanced Toolkit (ATK), including the source code tree, build process, and interfaces of the software components.

Audience

This document is intended for software, hardware, and system engineers who are planning to use the product and for anyone who wants to understand more about the product.

Conventions

This document uses the following conventions:

`Courier`	Is used to identify commands, explicit command parameters, code examples, expressions, data types, and directives.
Italic	Is used for emphasis, to identify new terms, and for replaceable command parameters.

Reference

The following documents were referenced to build this document.

1. i.MX31 ROM User’s Guide

Organization

This document contains the following chapters.

- Chapter 1, “Introduction,” describes the ATK components and source code tree.
- Chapter 2, “Build Procedure,” explains how to build the ATK source codes.
- Chapter 3, “Development Guidelines,” introduces the APIs for each component.
- Chapter 4, “Additional Information,” responds to frequently asked questions.

Definitions, Acronyms, and Abbreviations

Table i contains acronyms and abbreviations used in this document.

Table i. Acronyms and Abbreviations

Term	Definition
ATK	Advanced Toolkit
RKL	Ram Kernel

Table i. Acronyms and Abbreviations (continued)

Term	Definition
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus

Chapter 1
Introduction

Advanced Toolkit (ATK) is a container of tools for the i.MX processor family. It integrates two main tools:

- Flash tool for programming/dumping/erasing
- Fuse tool for programming/sensing/reading
- Code Signing Tool
- Utility tools including Image Conversion tool, DCD build tool, and HAB image build tool.

You can use the ATK to develop applications for the i.MX processors. As it is, the ATK is not suitable to be used as a mass production tool. However, using this document as reference, you can develop a mass production tool.

1.1 ATK Components and Environment

Figure 1-1 illustrates the ATK components and environment in which the ATK is used.

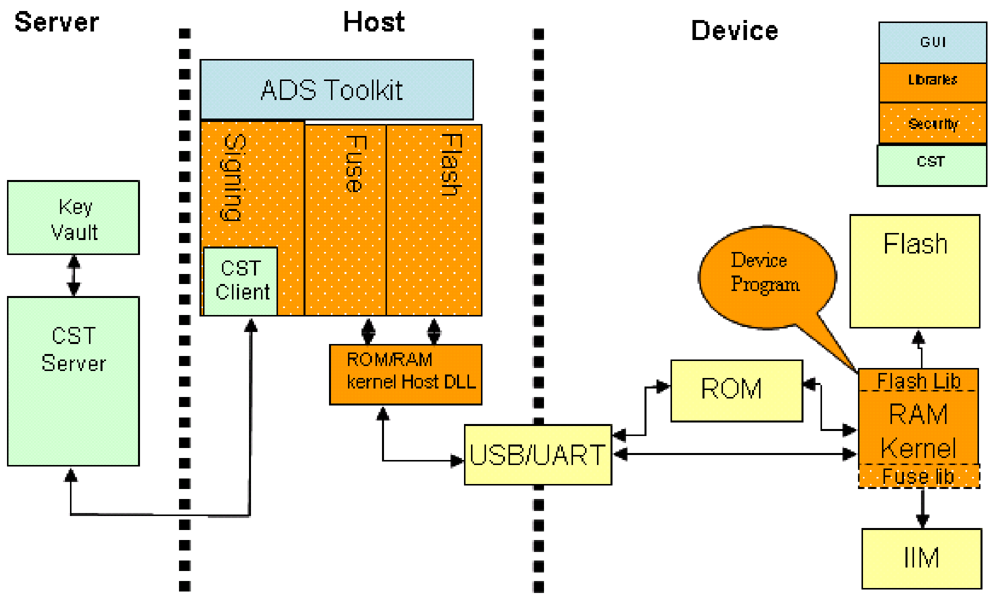


Figure 1-1. ATK Components and Environment

The PC host communicates with the target board (containing an i.MX processor) over a USB or UART link.

NOTE

The fuse and code signing functionalities are reserved in the standard ATK package.

The ATK provides the following components:

1. A GUI application that supports the following tools:
   — A Flash Tool that enables you to program/dump/erase Flash memory on the target board.
   — A Fuse Tool enables you to read, sense, override and program fuses on the device.
   — A code signing tool enables you operate code signing over a connection with the server.
   — An image conversion tool. a DCD build tool and a AHAB (High Assurance Boot) image build tool.
2. A Host DLL (Dynamic Link Library), which supports ROM bootstrap and RAM kernel protocols. The Host DLL sends commands to the device and receives responses from the PC host through the USB/UART. The Host DLL is used by the Flash and fuse functions.
3. A device program that runs in the target board RAM and executes operations specified by the hardware:
   — A RAM kernel library, which supports RAM kernel protocols between the host and device (handling commands from the PC host and sending responses to the device).
   — A Flash library, which provides the interfaces to the Flash media, such as NOR Flash, NAND Flash, MMC, and others.
   — A Fuse Library, which provides the access inerfaces to IC Identification Module (IIM) fuses.

1.2 Source Code Tree

In order to make ATK integration support straightforward, we recommend that you structure your source code tree to be similar to that listed in Table 1-1.

Table 1-1. Recommended Source Code Tree Structure for ATK

Directory	Subdirectory	Description
device_program/	—	Device program, which includes RAM kernel, Flash, and fuse libraries **Note:** The source codes for fuse library are obtainable only under NDA. Contact your local Freescale support for details.
	bin/	Location for storing of output binary files, map files, and elf files after building
	cw_mcp/	Examples for Code Warrior projects; these files are references for developers who will use Code Warrior as the development tool for device programs.
	Fuse/	Source code for the Fuse library. Note: The source code for the Fuse library may be obtained only under NDA. Please contact Freescale support for details.
	Flash/	Source code for different Flash libraries.
	init/	Initialization code for GNU environment.
	ram_kernel/	RAM kernel library
	global_inc/	Global header files

Table 1-1. Recommended Source Code Tree Structure for ATK (continued)

Directory	Subdirectory	Description
gui_application/		ATK GUI application
	bin	DLL and executable programs when running CST and image conversion tools
	Config	Configuration files used when running Flash
	FuseMap	Code for Fuse map
	GridCtrl_src	Code for the grid needed by the DCD tool.
	Image	Device program libraries with RAM kernel, Flash for i.MX processors.
	Platform	Code that is dependent on the hardware platform.
		Host DLL to support ROM bootstrap and RAM kernel protocols.
host_dll/	ComPort	Code for serial port operations.
	MXUsb.lib	USB library, which was developed using the Jungo development kit.

Chapter 2
Build Procedure

This chapter explains how to build the ATK source codes.

2.1 Set Up the Build Environment

2.1.1 Install Source Code Tree

Obtain the ATK source code package and run the install execution FSL_ATK_SOURCE_CODE_STD_<version_number>.exe to install the source code to a directory <ATK_SRC_PATH> (for example, atk_src) on a PC with Windows XP/Windows 2000 OS.

NOTE

Ensure that the layout of your source code tree under the <`ATK_SRC_PATH`> is the same as that shown in Table 2-1.

2.1.2 Get/Install Development/Build Tools

To build the host DLL and guide applications, Microsoft Visual C++ 2005 must be installed.

To build the device program, Cygwin and GNU gcc (Table 2-1) must be installed.

Table 2-1. Where to Obtain Build/Development Tools

Software	Download from
Cygwin	from http://www.cygwin.com/. setup.exe and Cygwin package releated instructions can be found For Cygwin installation instructions, see section 4.5. Installing Cygwin for ATK.
GNU gcc toolchain for cygwin	4.1.1 version under http://www.gnuarm.com/bu-2.17_gcc-4.1.1-c-c++_nl-1.14.0_gi-6.5.exe To install GNU gcc, follow the installation instructions and use the default settings.

NOTE

Make sure to select the correct `cygwin1.dll` for building. This `cygwin1.dll` for the ARM-ELF tool chain is located under the GNUARM bin directory after GNU gcc is installed. For example:

```
C:\Program Files\GNUARM\bin
```

Once some issues happen, which should be caused by the collisions of cygwin1.dlls or other cygwin dlls, respectively, in `C:\Program Files\GNUARM\bin` and `C:\cygwin\bin`, you must copy all cygwin.dll files under `C:\Program Files\GNUARM\bin` to `C:\cygwin\bin` or any directory where Cygwin installed.

2.2 Build Device Program with Cygwin/armgcc

This section describes the tools and commands you will need.

1. Ensure that the tools listed in Section 2.1.2, "Get/Install Development/Build Tools," are installed.
2. Launch `cygwin Bash shell`.
3. Change directory `cd <ATK_SRC_PATH>/device_program/`

   ```
   e.g. $cd /cygdrive/d/atk_src/device_program/
   ```

4. Enter the build commands according to build targets (Table 2-2).

Table 2-2. Build Commands

Build Commands	Comments
make clean	Clean all unnecessary output files (such as object files) when generating during the build procedure.
make MCU={user input} REV={user input} FLASH_TYPE={user input} FLASH_MODEL={user input}	Build device program with MCU type, Revision Version, Flash type & model and Fuse library. For commandf detail, see Table2-3 (a).
make MCU={user input} REV={user input} flashlib FLASH_TYPE={user input} FLASH_MODEL={user input}	Build the device program with MCU type, Revision Version, Flash type, and model .The option "flashlib" will build only the Flash library and the fuse library will be built out. For command details, see Table 2-4 (b). **Note:** If you have only the standard source codes package, use this build command.
make MCU={user input} unittest	Build device program with dummy Flash and fuse library.

Optional compiler flags for IC_TYPE and FLASH_TYPE:

- MCU: indicates the type of IC.
  - mx31: i.MX31 chip
  - mx32: i.MX32 chip
  - mx27: i.MX27 chip
  - mx35_: i.MX35 chip
  - mx37: i.MX37 chip
  - mx51: i.MX51 chip
  - mx25: i.MX25 chip
- REV: indicate Revision version of the chip specified by MCU. it is used to distinguish the different images for different revisions of the same chip type.Currently, it is used to i.MX51 TO2 NAND, i.MX35 TO1/TO2 MMC/SD and i.MX51 TO1/TO2 MMC/SD
  - to1: Revision version 2
  - to2: Revision version 2

- FLASH_TYPE: indicates the type of Flash.
  - nor: NOR Flash
  - nand: NAND Flash
  - mmc: MMC
  - sd: SD
- FLASH_MODEL*:* indicates the Flash model
  - spansion*:* NOR Flash S71WS256ND0/SG29GL512N

NOTE

From Version 1.5.1, FLASH_MODEL should be obsolete if FLASH_TYPE=nand.

For more details about build flags, see Makefile under: `<ATK_SRC_PATH>device_program/Flash/`

Table 2-3 provide example Build command for building Flash and fuse libraries for the i.MX27/i.MX31/i.MX32/i.MX35/i.MX37/i.MX51/i.MX25 boards.

Table 2-3. Example Build Commands for building Flash and Fuse Libraries

Build a device program for	Featuring	Command
MGN board and 3-stack board	i.MX31 chip and K9F4G08U0M/ K9K2G08R0 NAND Flash	make MCU=mx31 FLASH_TYPE=nand
i.MX31ADS board	i.MX31 chip, K9K1G08U0B NAND Flash	make MCU=mx31 FLASH_TYPE=nand
	i.MX31 chip, MMC card	make MCU=mx31 FLASH_TYPE=nand
	i.MX31 chip, S71WS256ND0 NOR Flash	make MCU=mx31 FLASH_TYPE=nor FLASH_MODEL=spansion
i.MX32ADS board	i.MX32 chip, K9F4G08U0M/ K9K2G08R0 NAND Flash	make MCU=mx32 FLASH_TYPE=nand
	i.MX32 chip, K9K1G08U0B NAND Flash	make MCU=mx32 FLASH_TYPE=nand
	i.MX32 chip, MMC card	make MCU=mx32 FLASH_TYPE=mmc
	i.MX32 chip, S71WS256ND0 NOR Flash	make MCU=mx32 FLASH_TYPE=nor FLASH_MODEL=spansion
i.MX27ADS board	i.MX27 chip, K9K1G08U0B NAND Flash	make MCU=mx27 FLASH_TYPE=nand
	i.MX27 chip, S71WS256ND0 NOR Flash	make MCU=mx27 FLASH_TYPE=nor FLASH_MODEL=spansion
i.MX27 3-Stack HW	i.MX27 TO2 chip, K9K2G08R0 NAND Flash	make MCU=mx27 FLASH_TYPE=nand

Build a device program for	Featuring	Command
i.MX35 TO1/TO2 3-Stack HW	i.MX35 TO1/TO2 chip, K9LAG08U0M NAND Flash	make MCU=mx35 FLASH_TYPE=nand
	i.MX35 TO1/TO2 chip, SG29GL512N NOR Flash	make MCU=mx35 FLASH_TYPE=nor FLASH_MODEL=spansion
	i.MX35 TO1 chip, MMC/SD card	make MCU=mx35 REV=to1 FLASH_TYPE=mmc
	i.MX35 TO2 chip, MMC/SD	make MCU=mx35 REV=to2 FLASH_TYPE=mmc
i.MX37 3-Stack HW	i.MX37 chip, K9LBG08U0M NAND Flash	make MCU=mx37 FLASH_TYPE=nand
	i.MX37 chip, MMC/SD card	make MCU=mx37 FLASH_TYPE=mmc
i.MX51 TO1 3-Stack HW	i.MX51 TO1 chip, K9LBG08U0M NAND Flash	make MCU=mx51 FLASH_TYPE=nand
	i.MX51 TO1 chip, MMC/SD card	make MCU=mx51 REV=to1 FLASH_TYPE=mmc
i.MX51 TO2 3-Stack HW	i.MX51 TO2 chip, MT29F32G08QAA NAND Flash	make MCU=mx51 REV=to2 FLASH_TYPE=nand
	i.MX51 TO2 chip, MMC/SD card	make MCU=mx51 REV=to2 FLASH_TYPE=mmc
i.MX25 3-Stack HW	i.MX25 TO1/TO1.1 chip, K9LAG08U0M NAND Flash	make MCU=mx25 FLASH_TYPE=nand
	i.MX25 TO1/TO1.1 chip, MMC/SD card	make MCU=mx25 FLASH_TYPE=mmc

Table 2-4 provides example commands for building Flash and dummy fuse libraries for the i.MX27/i.MX31/i.MX32/i.MX35/i.MX37/i.MX51/i.MX25 boards.

Table 2-4. Example Build Commands for building Flash and Dummy Fuse Libraries

Build a device program for	Featuring	Command
MGN board and 3-stack board	i.MX31 chip and K9F4G08U0M/ K9K2G08R0 NAND Flash	make MCU=mx31 flashlib FLASH_TYPE=nand
i.MX31ADS board	i.MX31 chip, K9K1G08U0B NAND Flash	make MCU=mx31 flashlib FLASH_TYPE=nand
	i.MX31 chip, MMC card	make MCU=mx31 flashlib FLASH_TYPE=nand
	i.MX31 chip, S71WS256ND0 NOR Flash	make MCU=mx31 flashlib FLASH_TYPE=nor FLASH_MODEL=spansion

Table 2-4. Example Build Commands for building Flash and Dummy Fuse Libraries (continued)

Build a device program for	Featuring	Command
i.MX32ADS board	i.MX32 chip, K9F4G08U0M/ K9K2G08R0 NAND Flash	make MCU=mx32 flashlib FLASH_TYPE=nand
	i.MX32 chip, K9K1G08U0B NAND Flash	make MCU=mx32 flashlib FLASH_TYPE=nand
	i.MX32 chip, MMC card	make MCU=mx32 flashlib FLASH_TYPE=mmc
	i.MX32 chip, S71WS256ND0 NOR Flash	make MCU=mx32 flashlib FLASH_TYPE=nor FLASH_MODEL=spansion
i.MX27ADS board	i.MX27 chip, K9K1G08U0B NAND Flash	make MCU=mx27 flashlib FLASH_TYPE=nand
	i.MX27 chip, S71WS256ND0 NOR Flash	make MCU=mx27 flashlib FLASH_TYPE=nor FLASH_MODEL=spansion
i.MX27 3-Stack HW	i.MX27 TO2 chip, K9K2G08R0 NAND Flash	make MCU=mx27 flashlib FLASH_TYPE=nand
i.MX35 TO1/TO2 3-Stack HW	i.MX35 chip, K9LAG08U0M NAND Flash	make MCU=mx35 flashlib FLASH_TYPE=nand
	i.MX35 chip, SG29GL512N NOR Flash	make MCU=mx35 flashlib FLASH_TYPE=nor FLASH_MODEL=spansion
	i.MX35 TO1chip , MMC/SD card	make MCU=mx35 REV=to1 flashlib FLASH_TYPE=mmc
	i.MX35 TO2 chip ,MMC/SD card	make MCU=mx35 REV=to2 flashlib FLASH_TYPE=mmc
i.MX37 3-Stack HW	i.MX37 chip, K9LBG08U0M NAND Flash	make MCU=mx37 flashlib FLASH_TYPE=nand
	i.MX37 chip, MMC card	make MCU=mx37 flashlib FLASH_TYPE=mmc
i.MX51 TO1 3-Stack HW	i.MX51 TO1 chip, K9LBG08U0M NAND Flash	make MCU=mx51 flashlib FLASH_TYPE=nand
	i.MX51 TO1 chip, MMC/SD card	make MCU=mx51 flashlib FLASH_TYPE=mmc
i.MX51 TO2 3-Stack HW	i.MX51 TO2 chip, MT29F32G08QAA NAND Flash	make MCU=mx51 REV=to2 flashlib FLASH_TYPE=nand
	i.MX51 TO2 chip, MMC/SD card	make MCU=mx51 REV=to2 flashlib FLASH_TYPE=mmc
i.MX25 3-Stack HW	i.MX25 TO1/TO1.1 chip, K9LAG08U0M NAND Flash	make MCU=mx25 flashlib FLASH_TYPE=nand
	i.MX25 TO1/TO1.1 chip, MMC/SD card	make MCU=mx25 flashlib FLASH_TYPE=mmc

NOTE

Execute “make clean” between different build commands.

5. Install the generated files in `<ATK_SRC_PATH>/device_program/bin` to the `<ATK_SRC_PATH>/gui_application/image` folder using the command:

```
make install DEST=../gui_application/image/
```

2.3 Building the Host DLL and GUI Application

In the ATK integration environment, the host dll and GUI applications are developed and built using Visual C++ 2005.

2.3.1 Build Host DLL

To build the host DLL, use these steps:

1. Open `<ATK_SRC_PATH>\host_dll\AtkHostApi_std.dsw` and set **Build**> **Configuration Manager** as **Win32 Release** for a release version or as **Win32 Debug** for a debug version.
2. Check **Project** > **Properties** > **Configuration Properties** > **General** > **Project Defaults** > **Use of MFC** as **Use MFC in a Static Library**.
3. Check **Project** > **Properties** > **Configuration Properties** > **Linker** > **Input** > **Additional Dependencies** to make sure `MXUsb.lib` is linked.
4. Select **Build** > **Rebuild AtkHostApi**. After building is complete, install the generated files under
   `<ATK_SRC_PATH>\host_dll\Release\` to `<ATK_SRC_PATH>\gui_application\Release`
   OR
   `<ATK_SRC_PATH>\host_dll\Debug\` to `<ATK_SRC_PATH>\gui_application\Debug`

Table 2-5 provides the copy locations for the host DLL files.

Table 2-5. Copy the Host DLL Files

Copy from	To
<ATK_SRC_PATH>\host_dll\Release\AtkHostApi_std.dll	<ATK_SRC_PATH>\gui_application\Release
<ATK_SRC_PATH>\host_dll\Debug\AtkHostApi_std.dll	<ATK_SRC_PATH>\gui_application\Debug

2.3.2 Build the GUI Application

To build the GUI application, use these steps:

1. Open `<ATK_SRC_PATH>\gui_application\ADSToolkit_std.dsw`.
2. Set **Build** > **Configuration Manager** as **Win32 Release** for a release version or as **Win32 Debug** for a debug version.
3. Set **Project** > **Properties** > **Configuration Properties** > **General** > **Project Defaults** > **Use of MFC** as **Use MFC in a Static Library**.
4. Check **Project** > **Properties** > **Configuration Properties** > **Linker** > **Input** > **Additional Dependencies** to make sure that `AtkHostApi_std.lib` is linked to the right location. By default `AtkHostApi_std.lib` is linked to one of the following:

`../host_dll/Release/AtkHostApi_std.lib`

OR

`../host_dll/Debug/AtkHostApi_std.lib`

5. Select **Build** > **Rebuild ADSToolkit**.

   The output file ADSToolkit_stdt.exe is located in the one of the following `<ATK_SRC_PATH>\gui_application\Release`, or

   `<ATK_SRC_PATH>\gui_application\Debug directory`.

2.4 Generate the ATK Package

To run ATK normally, generate the ATK package:

1. If `ADSToolkit.exe` is located under package location `<ATK_TOOL_PATH>`. Then install `AtkHostApi_std.dll to <ATK_TOOL_PATH>`.
2. Copy the following directories to `<ATK_TOOL_PATH>`:
   `<ATK_SRC_PATH>\gui_application\bin`
   `<ATK_SRC_PATH>\gui_application\config`
   `<ATK_SRC_PATH>\gui_application\image`
3. Install {ATK_SRC_PATH}\cst_windows to <ATK_TOOL_PATH>.

Chapter 3
Development Guidelines

This chapter introduces the APIs for each component.

3.1 APIs of Device Program

The device program integrates the RAM kernel, Flash library, and Fuse library. The device program is downloaded to external RAM through USB/UART according to the ROM bootstrap protocol.

3.1.1 Device RAM Kernel

The device RAM kernel is the interface that communicates with the host. The device RAM kernel receives commands from the host and calls the corresponding library functions to execute the commands, and then sends the response to the host (where you can see it).

3.1.1.1 RAM Kernel Protocol

This section describes the RAM kernel protocol. A device parses commands and sends responses by following the RAM kernel protocol.

Each stage in the RAM kernel protocol begins with a command issued by the host to the device, followed by a response from the device to the host. Table 3-1 shows command/response package format, and Table 3-2 describes the parameters.

Table 3-1. Command/Response Package Format

COMMAND (16 bytes)	0x06	0x06	cmd[15:0]	addr[31:0]	param1[31:0]	param2[31:16]	param2[15:8]	Param2[7:0]
RESPONSE (8 bytes)	ack[15:0]		csum[15:0]	len[31:0]				
DATA	Data[ ]							

Table 3-2. RAM Kernel Protocol, Compact Format

Term	Description
addr[31:0]	Flash offset to Flash address or fuse address
cmd[15:0]	Command ID
param1[31:0]	Flash erase/dump/program size

Table 3-2. RAM Kernel Protocol, Compact Format (continued)

Term	Description
Param2[7:0]	Different usages for different operations: For dumping, it is used to indicate following up operation For programming, it is used to indicate the file format For erasing, it is reserved.
Param2[15:8]	Different usages for different operations: For programming, it is used to indicate following up operation For dumping and erasing, it is reserved
param2[31:16]:	Reserved
ack[15:0]	Successful or error ID
len[31:0]	Data length
csum[15:0]	Checksum when dumping Flash data
data[]	Data, whose length is identified by len[31:0]

3.1.1.2 Common Commands/Responses

The information that follows describes the commands and responses supported by the current RAM kernel.

3.1.1.2.1 Reset

Command	0x06	0x06	0x0201	*Reserved*	*Reserved*	*Reserved*	*Reserved*	*Reserved*

3.1.1.2.2 Download

Command	0x06	0x06	0x0202	Download address	Size in bytes	*Reserved*	*Reserved*	*Reserved*
Response	OK/Error		*Reserved*	*Reserved*	—			

3.1.1.2.3 Execute

Command	0x06	0x06	0x0203	Execute address	*Reserved*	*Reserved*	Reserved	Reserved

3.1.1.2.4 Get version

Command	0x06	0x06	0x0204	*Reserved*	*Reserved*	*Reserved*	—	—
Response	0x00		i.MX processor ID	Model name length	—			
Data	Flash model name							

3.1.1.3 Flash Commands/Responses:

3.1.1.3.1 Flash initialize

Command	0x06	0x06	0x0001	*Reserved*	*Reserved*	*Reserved*	Reserved	Reserved
Response	OK/Error		*Reserved*	*Reserved*	—			

3.1.1.3.2 Flash erase

Command	0x06	0x06	0x0002	Offset address	Size in bytes	*Reserved*	Reserved	Reserved
Response	0x01		*Reserved*	*Erase progress (finished size)*	—			
Response	OK/Error		*Reserved*	*Reserved*	—			

3.1.1.3.3 Flash dump

Command	0x06	0x06	0x0003	Offset address	Size in bytes	*Reserved*	Reserved	Follow up operation indication
Response	OK/Error		Checksum	Data length	—			
Data	Data							

3.1.1.3.4 Flash program (page or block program)

Command	0x06	0x06	0x0004	Offset address	Size in bytes	*Read Back Checking Flag*	Follow up operation indication	File format
Response	OK/Error		Checksum	Data length	—			

3.1.1.3.5 Flash get capacity

Command	0x06	0x06	0x0006	*Reserved*	*Reserved*	*Reserved*	*Reserved*	*Reserved*
Response	OK/Error		*Reserved*	Data length	—			

3.1.1.4 Fuse Commands/Responses:

3.1.1.4.1 Fuse read

Command	0x06	0x06	0x0101	Fuse adddress	*Reserved*	*Reserved*	*Reserved*	*Reserved*
Response	OK/Error		Fuse value	*Reserved*	—			

3.1.1.4.2 Fuse sense

Command	0x06	0x06	0x0102	Fuse address	Bit position	*Reserved*	Reserved	Reserved
Response	OK/Error		Fuse value	*Reserved*	—			

3.1.1.4.3 Fuse program

Command	0x06	0x06	0x0104	Fuse address	Programe Value	*Reserved*	Reserved	Follow up operation indication
Response	OK/Error		*Reservd*	*Reserved*	—			

NOTE

The program value are 1 byte in length, and only the bits set as 1 in this value will be programmed.

3.1.1.5 Extend Command/Response:

3.1.1.5.1 Switch from UART to USB connection

Command	0x06	0x06	0x0301	*Reserved*	*Reserved*	*Reserved*	Reserved	Reserved
Response	OK/Error		*Reserved*	*Reserved*	—			

3.1.1.5.2 Swap BI SWAP Flag

Command	0x06	0x06	0x0302	*Reserved*	Size in bytes	*Reserved*	Reserved	Reserved
Response	OK/Error		*Reserved*	*Reserved*	—			

3.1.1.5.3 Set BBT Flag

Command	0x06	0x06	0x0303	*Reserved*	Size in bytes	*Reserved*	Reserved	Reserved
Response	OK/Error		*Reserved*	*Reserved*	—			

3.1.1.5.4 Set interleave Flag

Command	0x06	0x06	0x0304	*Reserved*	Size in bytes	*Reserved*	Reserved	Reserved
Response	OK/Error		*Reserved*	*Reserved*	—			

3.1.1.5.5 Set Logic Block Address (LBA) Flag

Command	0x06	0x06	0x0305	*Reserved*	Size in bytes	*Reserved*	Reserved	Reserved
Response	OK/Error		*Reserved*	*Reserved*	—			

3.1.1.6 Source Code of Device RAM Kernel

The device RAM kernel source code is located under <ATK_SRC_PATH>\device_program\ram_kernel\src.

Table 3-3 describes the source files.

Table 3-3. Source files for Device RAM Kernel

File	**Description**
main.c	Contains the main functions of the device program: Parses commands from host to execute Flash/fuse/utility functions, then sends responses to the device.
Platform\mx**\src\channel.c	Channel function: supports USB/UART for different i.MX chips.
Platform\mx**\src\platform.c	Platform specific functions to retrieve chip ID, reset and so on.

3.1.2 Flash Library

The Flash library contains interfaces and source code.

3.1.2.1 Device Flash Interfaces

The Flash library provides general operations (dump/program/erase) for different storage devices (NOR/NAND/MMC). The device RAM kernel calls Flash interfaces to execute commands from the host side. Table 3-4 identifies the interfaces of the Flash library and their corresponding commands.

Table 3-4. APIs of the Device Flash Library

Command	Flash API
Flash initial	s16 atk_Flash_lib_initial (void); Initializes the Flash library device, including check device vendor, id, and other physical parameters. Returns: If initialization is OK, returns RET_SUCCESS; otherwise returns error information.
Flash erase	s16 atk_Flash_lib_erase (u32 addr, u32 size, response_callback callback); Erases an area of Flash. Parameters: addr [in] Flash offset address where erasure will start size [in] erase size in bytes. callback [in] response send callback. Returns: If erase is successful, returns RET_SUCCESS; otherwise returns FLASH_FAILED;
Flash dump	s16 atk_Flash_lib_read (u32 addr, u8 *buffer, u32 count, dump_callback callback, u32 bufsize); Dumps an area of Flash and returns the data size of the area that was actually dumped. Parameters: addr [in] the Flash offset address where the area to be dumped starts buffer [out] an input buffer for library function to fill data in count [in] the dump size in bytes. callback [in] response send callback. bufsize [in] the size of buffer: If dumping is successful, returns RET_SUCCESS; if the dump range exceeds the Flash size, returns FLASH_PARTLY; if ECC error occurs, returns FLASH_ECC_FAILED; otherwise returns FLASH_FAILED.

Table 3-4. APIs of the Device Flash Library (continued)

Command	Flash API
Flash program	s16 atk_Flash_lib_program (u32 addr, const u8 *buffer, u32 *pcount, u16 *pcsum, u8 mode, u8 file_format, response_callback callback); Programs an area of Flash, and returns the actual programmed size and checksum. Parameters: addr [in] the Flash offset address where the area to be programmed starts. buffer [in] buffer containing the program data. pcount [in/out] program size in bytes, and returns the actually program size. pcsum [out] returns the actually programmed data checksum on Flash. mode [in] See FLASH_PRG_MODE: boundary or un-boundary mode. file_format[in] See FLASH_FILE_FORMAT: normal format(binary) or nb0 file format. It is only used by the NAND Flash driver. callback [in] response send callback. Returns: If programming is successful, returns RET_SUCCESS; if the selected program range exceeds the Flash size, returns FLASH_PARTLY; if ECC error, returns FLASH_ECC_FAILED; otherwise returns FLASH_FAILED.
Get Model	void atk_Flash_get_model(u8 *fmodel, u32 *len); Gets the Flash name running on the target Parameters: fmodel [out] pointer to the buffer to store the Flash name. len [out] the Flash model length, which should be less than FLASH_MODEL_MAX. Returns: N/A **Note:** The Flash model string returned here should be the same as the Flash model string defined in <ATK_SRC_PATH>\gui_application\config\ADSToolkit.cfg. Otherwise, the Flash tool may not work normally.
Get Capacity	s16 atk_flash_get_capacity(u32 *size); Get the flash capacity Parameters: size [out] pointer to the buffer to store the flash capacity Returns: If getting capacity is successful, returns RET_SUCCESS; otherwise return FLASH_FAILED

NOTE

When supporting a new flash, you must re-implement the APIs in Table 3-4. If a new flash is similar to the flash types supported by the ATK, you can use the source codes in Section 3.1.2.2, “Source Code of Device Flash Library,” as a reference.

3.1.2.2 Source Code of Device Flash Library

The source code of the device Flash library is located under <ATK_SRC_PATH>\device_program\Flash.

Table 3-5 describes these source files.

Table 3-5. Source Files of Device Flash Library

File	Description
mmc_Flash*	Files that support programming/dumping/erasing on MMC/SD card: • mx3x_mmc: supports i.MX31/i.MX32 MMC • mx35_mmc: supports i.MX35 TO1/TO2 MMC/SD • mx37_mmc: supports i.MX37 MMC/SD • mx51_mmc: support i.MX51 MMC/SD • mx25_mmc: support i.MX25 MMC/SD
sd_Flash*	Files that support programming/dumping/erasing on SD card: • mx3x_sd: support mx31/mx32 SD
nor_Flash*	Files that support programming/dumping/erasing on NOR Flash- spansion/inc: header files of nor flash and spansion nor flash low level driver file • spansion/src: source code of spansion nor flash operations and interfaces
nand_Flash*	Files that support programming/dumping/erasing on NAND Flash: • Inc: header files and low level driver operations for different NAND flashes • src: source code of NAND flash operations and interfaces
unit_test*	Files that support a dummy Flash library

3.1.3 Fuse Library

The Fuse library contains interfaces and source code.

3.1.3.1 Device Fuse Interfaces

The Flash library provides general Fuse operations (read/sense/programe). The device RAM kernel calls Fuse interfaces to execute commands from the host side.

Table 3-6 lists the interfaces of the Fuse library and their corresponding commands.

Table 3-6. APIs of the Device Fuse Library

Command	Flash API
Fuse read	s16 atk_fuse_lib_read(u32 addr, u8 *pval); Reads a fuse word. Parameters: addr [in]: fuse element address pval [out]: fuse word value returned Returns: If read is successful,return RET_SUCCRSS If the fuse element is read-protected, return FUSE_READ_PROTECT; otherwise returns FUSE_FAILED.
Fuse Program	s16 atk_fuse_lib_program (u32 addr, u8 val); Programs a fuse element. Parameters: addr [in] : fuse element address val [in] : fuse element value. Returns: If programe is successful and verify has passed, return RET_SUCCESS; If the fuse element is write-protected, returns FUSE_WRITE_PROTECT; if the program is successful, but verify can't be done, return FUSE_VERIFY_FAILED; otherwise returns FUSE_FAILED.
Fuse Sense	s16 atk_fuse_lib_sense (u32 addr, u8 *pval, u8 bit); Senses a fuse bit Parameters: addr [in] : Fuse element address pval [out] : fuse word value returned count [in] the dump size in bytes. Returns: If senseis successful, return RET_SUCCESS; If the fuse element is read protected, returns FUSE_SENSE_PROTECT; if the program is successful, but verify can't be done, return FUSE_VERIFY_FAILED; otherwise returns FUSE_FAILED

3.1.3.2 Source Code of Device Fuse Library

The source code of the device Fuse library is located under <ATK_SRC_PATH>\device_program\Fuse. Table 3-7 describles the files.

Table 3-7. Source Files of Device Fuse Library

File	Description
mx31_iim.h	i.MX31 iim memory map definitions
mx32_iim.h	i.MX32 iim memory map definitions
mx27_iim.h	i.MX27 iim memory map definitions
mx35_iim.h	i.MX35 iim memory map definitions
mx37_iim.h	i.MX37 iim memory map definitions
mx51_iim.h	i.MX51 TO1/TO2 iim memory map definitions
MX25_iim.h	i.MX25 iim memory map definitions

Table 3-7. Source Files of Device Fuse Library (continued)

File	Description
iim.h	The IIM memory map header file
fuse_lib.c	The file for fuse fucntions
unit_test	Dummy Fuse library.

3.1.4 GNU Building Environment for Device Program

Source files that are specific for the GNU-building environment are located under <ATK_SRC_PATH>\device_program.

Table 3-8 describes the files.

Table 3-8. Source Files of GNU Environment for Device Program

File	Description
Init\init.s	Start-up code for device program, which includes setting heap and stack, and jumping to main.
Makefile, rules.make, Flash\Makefile Fuse\Makefile Init\Makefile ram_kernel\Makefile	Makefiles for GNU-building environment, which define how to build a device program.
ram_kernel_mx31.lds ram_kernel_mx32.lds ram_kernel_mx27.lds ram_kernel_mx35.lds ram_kernel_mx37.lds ram_kernel_mx51.lds ram_kernel_mx25.lds	Scatter files for different chips. The start address of the device program is linked as 0x8000_4000 for i.MX31/i.MX32 boards, 0x0xA000_4000 for i.MX27 boards, 0x8000_4000 for i.MX35/i.MX37/i.MX25 boards, 0x9000_4000 for i,MX51 board. **Note:** The above 0x4000 bytes before link start address are used by the GUI application: When the memory layout in the device program is changed, please verify that the file MXDefine.h in <ATK_SRC_PATH>\gui_application\Platform\ is updated accordingly (if necessary). For i.MX35/i.MX37/i.MX51/i.MX25, the flash header should be reserved in the link file as ROM required. See i.MX35/i.MX37/i.MX51/i.MX25 IC Spec docs for more details.

3.2 APIs of ROM/RAM Kernel Host DLL

The ROM/RAM kernel Host DLL is a common component that communicates with the device program. It runs on the host and supports two protocols:

- ROM bootstrap protocol, which communicates with the ROM bootstrap.
- RAM kernel protocol, which communicates between host and device RAM.

The ROM/RAM kernel Host DLL provides a set of APIs that enables the GUI application to notify the device to execute corresponding operations.

3.2.1 Interfaces for ROM Kernel

The ROM bootstrap protocol enables you to download an application to one address and then execute that application in place. For more protocol information, see the *i.MX31 ROM User's Guide*. In the ATK environment, the ROM kernel protocol downloads the device program (RAM kernel, Flash library, and Fuse library) into external RAM. Table 3-9 describes the DLL APIs for the ROM kernel.

Table 3-9. APIs of Host ROM Kernel DLL

API	Description

InitComPort	Initializes the serial port that the PC is using,
	Config = 0 (MX31 TO1);
	Config = 1, i.MX31 TO2/i.MX27 TO1, i.MX32, i.MX35, i.MX37, i.MX51, i.MX25

CloseComPort	Closes the Serial Port,
	Config = 0 (MX31 TO1);
	Config = 1, i.MX31 TO2/i.MX27 TO1, i.MX32, i.MX35, i.MX37, i.MX51, i.MX25

WriteMemory	Writes data to a given address in memory. This address must be mapped in the i.MX process memory space.
Jump2Rak	Issues a complete command and jump to the entry function of a device program, then starts to execute the device program in the device.
DownloadCSF	Downloads a CSF image to the given address.
DownloadDCD	Downloads a DCD image to the given address
DownloadImage	Downloads the binary image file to the given address
ReadDataByRok	Reads the data from the given address
GetHABStatus	Reads the HAB status return from the ROM when HAB couldn’t pass authentication
OpenUSB	Opens a USB device
CloseUSB	Closes a USB device

3.2.2 Interfaces for Host RAM Kernel

The RAM Kernel Host DLL follows the protocol defined in Section 3.1.1, “Device RAM Kernel,” to assemble RAM Kernel commands and parse the responses. The RAM Kernel Host DLL provides an interface to the GUI application to execute flash and fuse operations.

Table 3-10 lists the APIs of the RAM Kernel Host DLL. Note that the parameters are similar to those in Section 3.1, “APIs of Device Program.”

Table 3-10. APIs of Host RAM Kernel DLL

API	Description
int InitFlash(void);	Initializes Flash.
int EraseFlash(unsigned long addr, unsigned long size);	Erases a select range of Flash. Supports erasing by block.
int ReadFlash(unsigned long addr, unsigned char *buffer, unsigned long count);	Dumps a selected area of Flash data.
ProgramFlash(unsigned long addr, const unsigned char *buffer, unsigned long count, int mode,UCHAR format =0)	Programs Flash.

Table 3-10. APIs of Host RAM Kernel DLL (continued)

API	Description
int ReadFuse(unsigned long addr, unsigned char *pval);	Read a fuse element
int SenseFuse(unsigned long addr, unsigned char *pval, unsigned char bit);	Sense a fuse elment
int ProgramFuse(unsigned long addr, unsigned char val);	Program a fuse element
int CommonReset(void);	Resets the device.
int GetRKLVersion(unsigned char *fmodel, int *len, int *mxType);	Gets device status (bootstrap or RAM Kernel): fmodel Flash model string len Flash model string length mxType chip ID Return: If the RAM kernel is running and len is not equal to 0, returns RET_SUCCESS.. If the bootstrap is running and len is equal to 0, returns RET_SUCCESS.. If no program is running, returns INVALID_CHANNEL.
int CommonDownload(unsigned long addr, unsigned long size, const unsigned char *pBuf)	Downloads data to one address using the RAM kernel protocol. addr the address to be downloaded to size data length pBuf data
int CommonExecute(unsigned long addr)	Jumps the device program to the specified address.
bool DoCom2Usb(void)	Request to switch from UART to USB
int SetBISwapFlag(int flag)	Set the BI Swap Flag
int SetBBTFlag(int flag)	Set the BBT Flag flag Input flag Return: return int,, none zero mean failed
int SetINTLVFlag(int flag)	Set the interleave Flag flag Input flag Return: return int,, none zero mean failed
int GetFlashCapacity(unsigned long *size)	Get flash capacity *size pointer to the flash capacity Return: Return int, none zero means failed
int SetLBAFLag(int flag)	Set Logic Block Address Flag flag: Input flag indicatig whether Logic Block Address is set. Return: Return int, none zero means failed
void SetUsbTimeout(int openTimeOut, int TransTimeOut)	Set USB timeout openTimeOut: the timeout value for open (attach) USB in seconds. TransTimeOut:the Timeout value for trans (read) USB in msecond.

NOTE

The Host RAM Kernel APIs should be called when the RAM kernel is running (except for the GetRKLVersion), which implies that these APIs should be called after executing Jump2Rak successfully. Otherwise, the INVALID_CHANNEL error will be returned.

3.2.3 Common APIs for Host DLL

Table 3-11 describes the common APIs of the Host DL

Table 3-11. Common APIs of the Host DLL

APIs	Descriptions
void SetWinHandle(HWND hWnd);	Sets the Window handle in order to send a message to the UI.
void SetUpChannal(int channal, int usbId);	Sets up the channel mode.
void SetEvtHandle(HANDLE hEvent);	Sets the event handle.

3.3 GUI Application—Use Cases

This section introduces some common use cases in the GUI application. These use cases show how the GUI application implements Flash functions through the Host DLL and how the Host DLL communicates with the i.MX device.

3.3.1 UART Use Case

This use case describes how to download a device program through the UART.

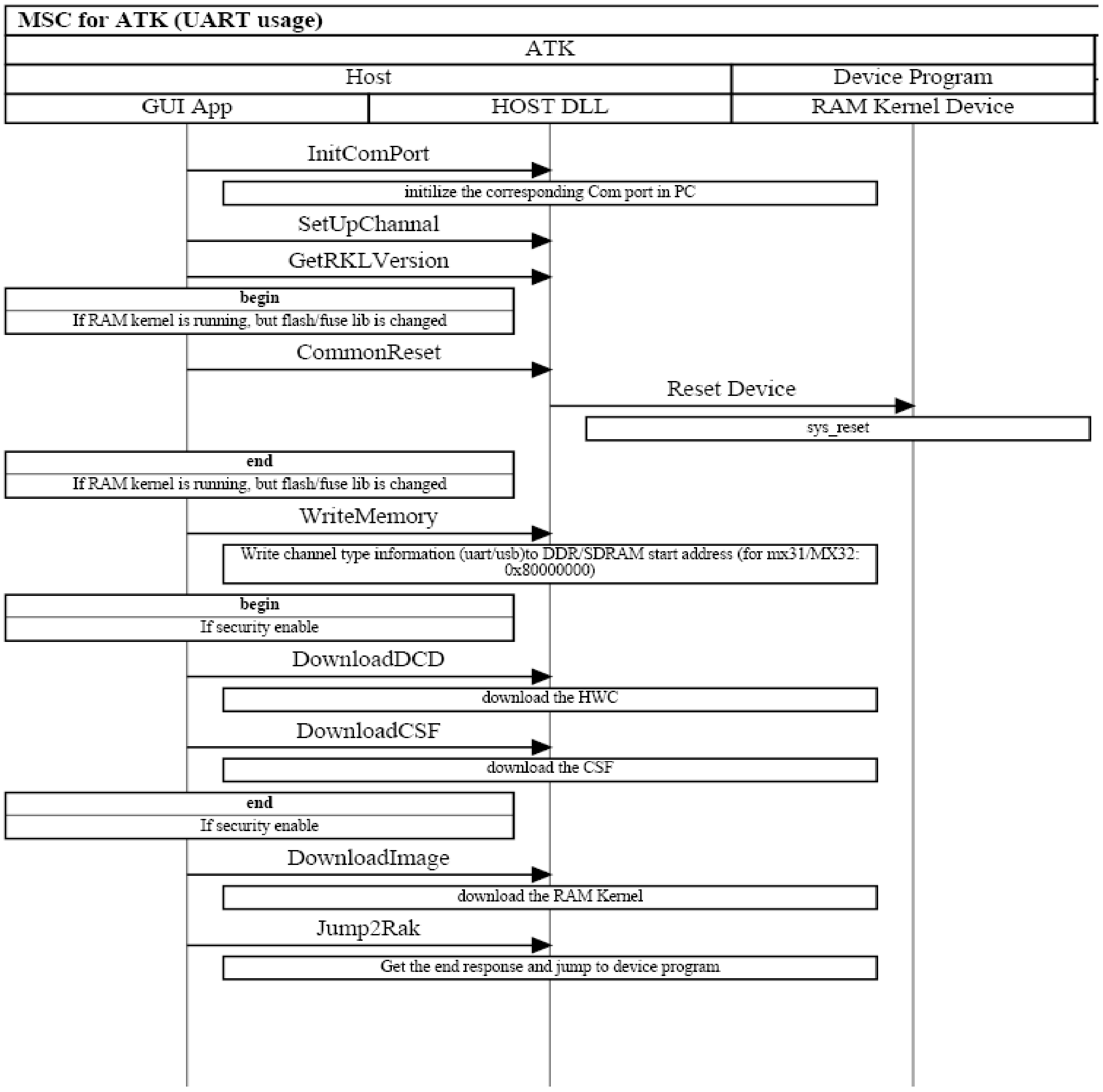


Figure 3-1. UART Use Case

3.3.2 USB Use Case

This use case describes how to download a device program through the USB.

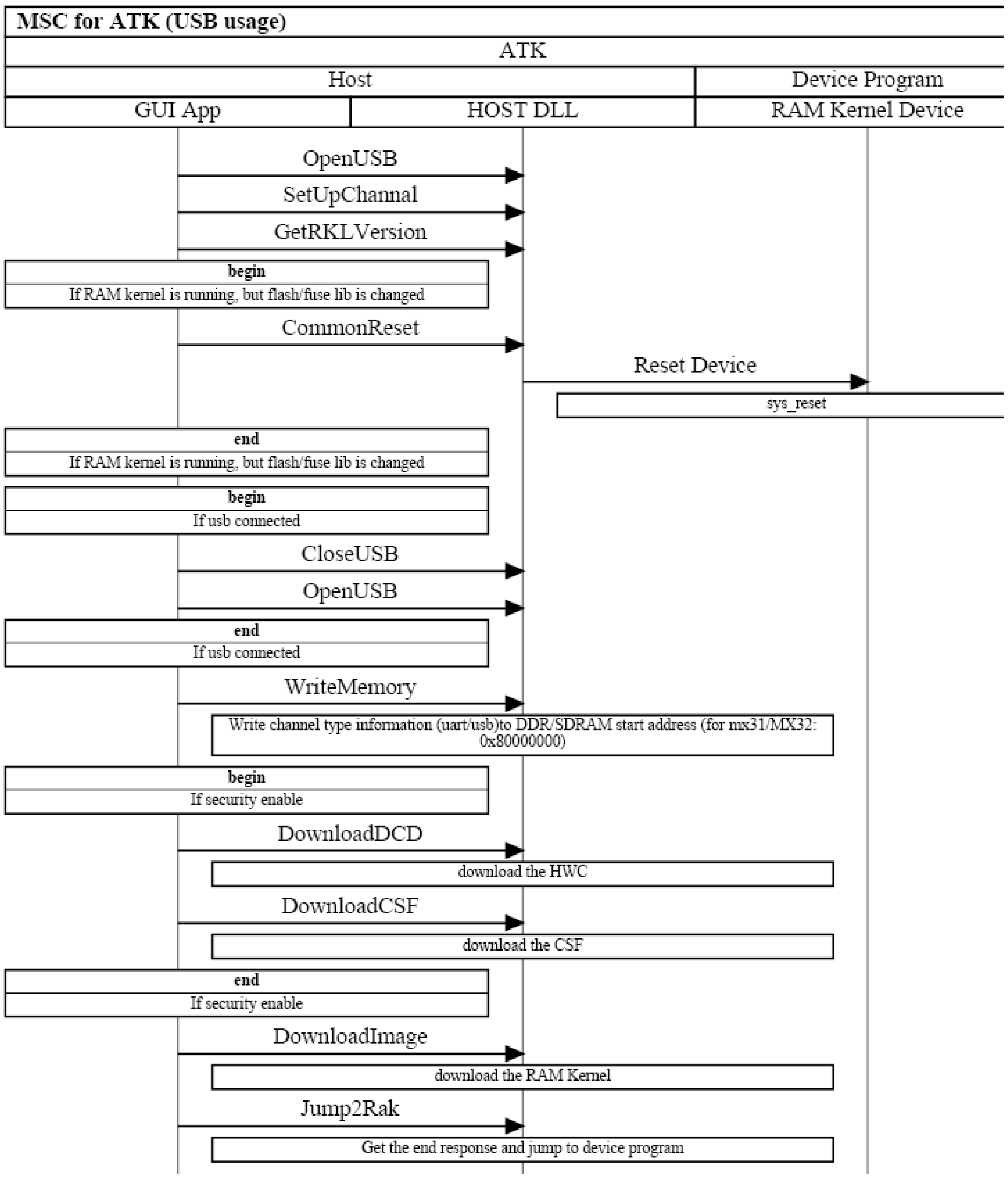


Figure 3-2. USB Use Case

3.3.3 Flash Programming Use Case

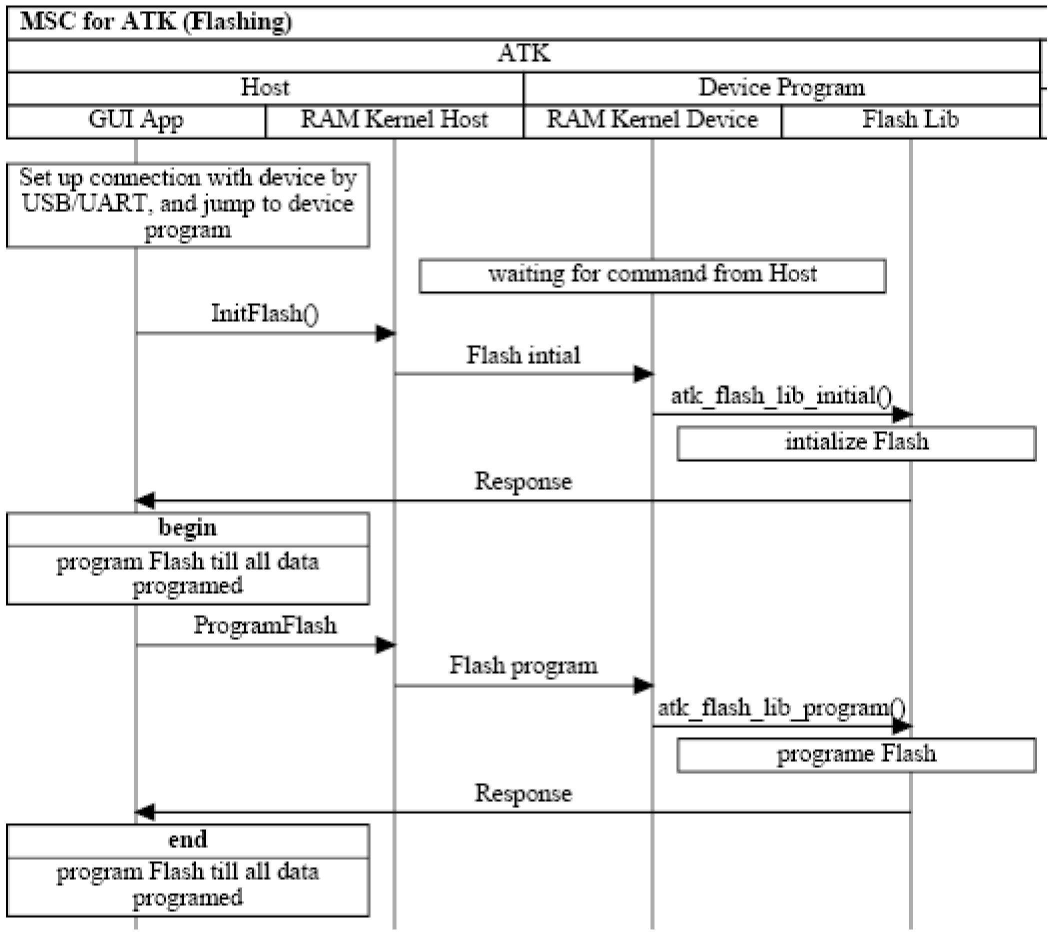
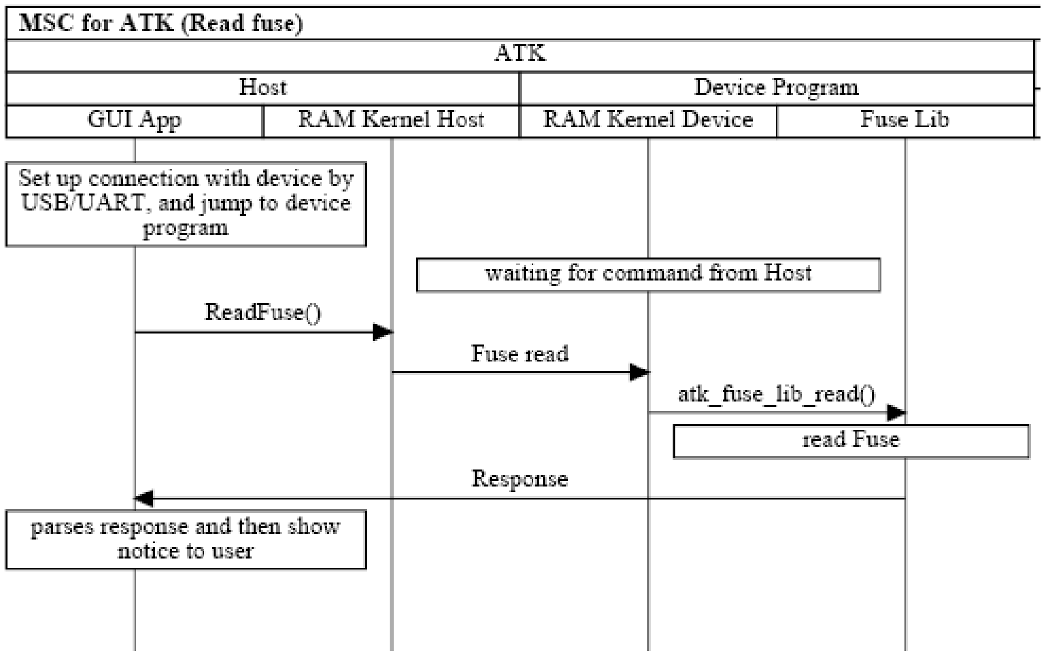


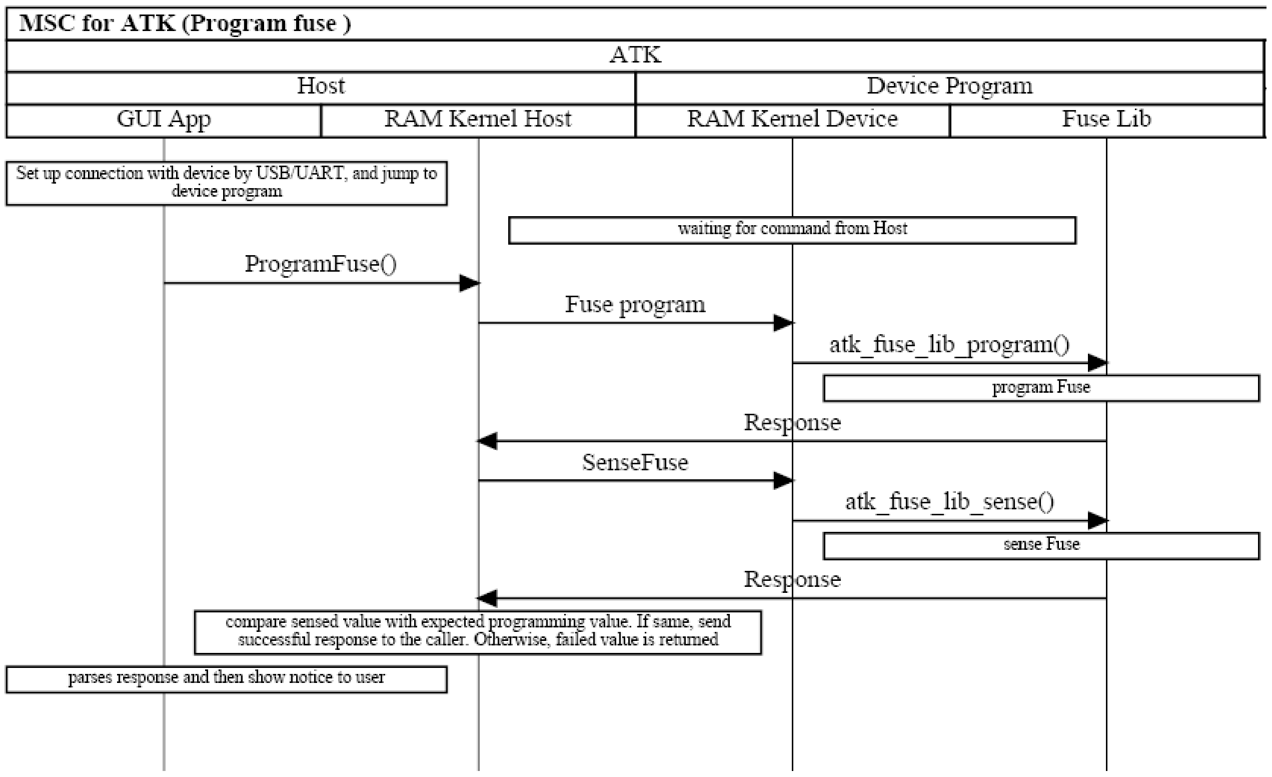
Figure 3-3. Flash Programming Use Case

3.3.4 Fuse Use Case(Read, program)

3.3.4.1 Read Fuse Use Case



3.3.4.2 Program Fuse Use Case


MSC for ATK (Program fuse)
ATK
Host
Device Program
GUI App
RAM Kernel Host
RAM Kernel Device
Fuse Lib
Set up connection with device by USB/UART, and jump to device program
waiting for command from Host
ProgramFuse()
Fuse program
atk_fuse_lib_program()
program Fuse
Response
SenseFuse
atk_fuse_lib_sense()
sense Fuse
Response
compare sensed value with expected programming value. If same, send successful response to the caller. Otherwise, failed value is returned
parses response and then show notice to user

Chapter 4
Additional Information

This chapter provides information about supporting a new Flash device, developing a device program using CodeWarrior, response for the Flash operations, and installing Cygwin for the ATK.

4.1 Supporting a New Flash Device

4.1.1 NAND Flash

Generate a new Flash library, using the following steps:

1. Add the new flash model to the nand_ids.c file. Correctly set each file.

   ```
   /*man  dev io  ps   oob  mo po scan row  blks    ppb  name */
    {0xEC, 0x76, 8, 512,  16, 5, 0,   1,  3,    4096, 32,  " myflashmodel " },
   ```

   The `nand_ids.c` file is located at: `<ATK_SRC_PATH>/device_program/flash/nand_flash/src`
2. Build the new flash lib according to the target platform, for example:

   ```
   make MCU=mx31 FLASH_TYPE=NAND
   ```
3. Copy the new flash lib to the location: `<ATK_SRC_PATH>/ gui_application/image/`
4. Load a new Flash library into the GUI. Add the new flash model string to the file `<ATK_SRC_PATH>/gui_application/config/ADSToolkit.cfg`

   For example:

   ```
   [Flash Model]
   [MX31]
   NAND:myflashmodel:image\mx31_nand.bin
   ```

4.1.2 NOR Flash

4.1.2.1 Generate new SPANSION NOR Flash Model

Generate a new Flash library, using the following steps:

1. Add the new flash model to the supported_mode array in `nor_flash.c` (`<ATK_SRC_PATH>/device_program/flash/nor_flash/spansion/src`) file, as follows:

```
static struct nor_flash_model supported_model[] = {

     {
         .device_name = "SG29GL512N",
         .device_size = DEVICE_64M,
         .max_wb_word = 16,
         .device_id = 0x22012223,
         .sector_size = { SECTOR_128K, 0 },
         .sector_mask = 0,
         },
    };
```

   device name: will be returned by the function `atk_Flash_get_model`
   device_size: in byte size
   max_wb_word: max write buffer word
   device_id: NOR flash ID read out by autoselect mode
   sector_size: sector size array, list out the supported different sector sizes
   sector_mask: use sector address to mask this value, and get the sector size index in `sector_size[]`
2. Build the new flash lib according to the target platform. For example:
   `make MCU=mx31 FLASH_TYPE=NOR FLASH_MODEL=SPANSON`
3. Copy the new flash lib to the location: `<ATK_SRC_PATH>/ gui_application/image/`
4. Load a new Flash library into the GUI.
5. Add the new flash model string to the file
   `<ATK_SRC_PATH>/gui_application/config/ADSToolkit.cfg`

   For example:
   ```
   [Flash Model]
   [MX31]
   NAND:myflashmodel:image\mx31_nor.bin
   ```

4.1.2.2 Support New Flash Model

1. Create your new flash model source folder under
   `<ATK_SRC_PATH>/device_program/flash/nor_flash/`
2. Create `inc/ src/` directory, and put your source files and include files into them
3. To generate the new Flash library, type the command.

4. make `MCU=mx31 FLASH_TYPE=NOR  FLASH_MODEL=YOURMODEL`
5. Make sure the flash library has been implemented and exported to the ram kernel. You do not need to modify the Makefile under `<ATK_SRC_PATH>/device_program/flash/`.

4.2 Developing a Device Program using CodeWarrior

There are examples for developing a device program using CodeWarrior in:
`<ATK_SRC_PATH>\device_program\cw_mcp`

To develop a device program using CodeWarrior, use these steps:

1. Create an mcp project file and add the necessary files to the project. Table 4-1 describes the files specified by Code Warrior.

Table 4-1. Source Files for the Device RAM Kernel

File	Description
init.s	Startup codes for device program
heap.s stack.s retarget.c	Define stack and heap for device program
scat_ram	Scatter files

For other necessary files for Flash, fuse, and RAM kernels, see Section 3.1.1, “Device RAM Kernel,” through Section 3.1.4, “GNU Building Environment for Device Program.”

34. Select **Edit** > **Debug/Release Settings**. Set compiler/build parameters such as Target setting, access path, Language settings and Linker, and others.

35. Select **make** to build the device program.

4.3 Why the Flash Operations need Response Callback

The Flash operations may take a long time due to the performance of certain Flash chipsets, such as NOR FLASH erase. This is because the ATK host does not get a response during the **erase** progress, and therefore does not count the number of erased sectors or blocks.

Meanwhile, the host UART **read** function waits for the response, including the timeout that makes the ATK host not stable enough. Therefore, the response **send callback parameter** is added to the Flash erase interface.

On the i.MX35/i.MX37/i.MX51/i.MX25 platforms, the watchdog modules on the chip were enabled before the RAM Kernel loaded. Therefore, all the flash operations that take a long time to finish must reset the watchdog by calling response callback, in order to send the current operation status back to the host.

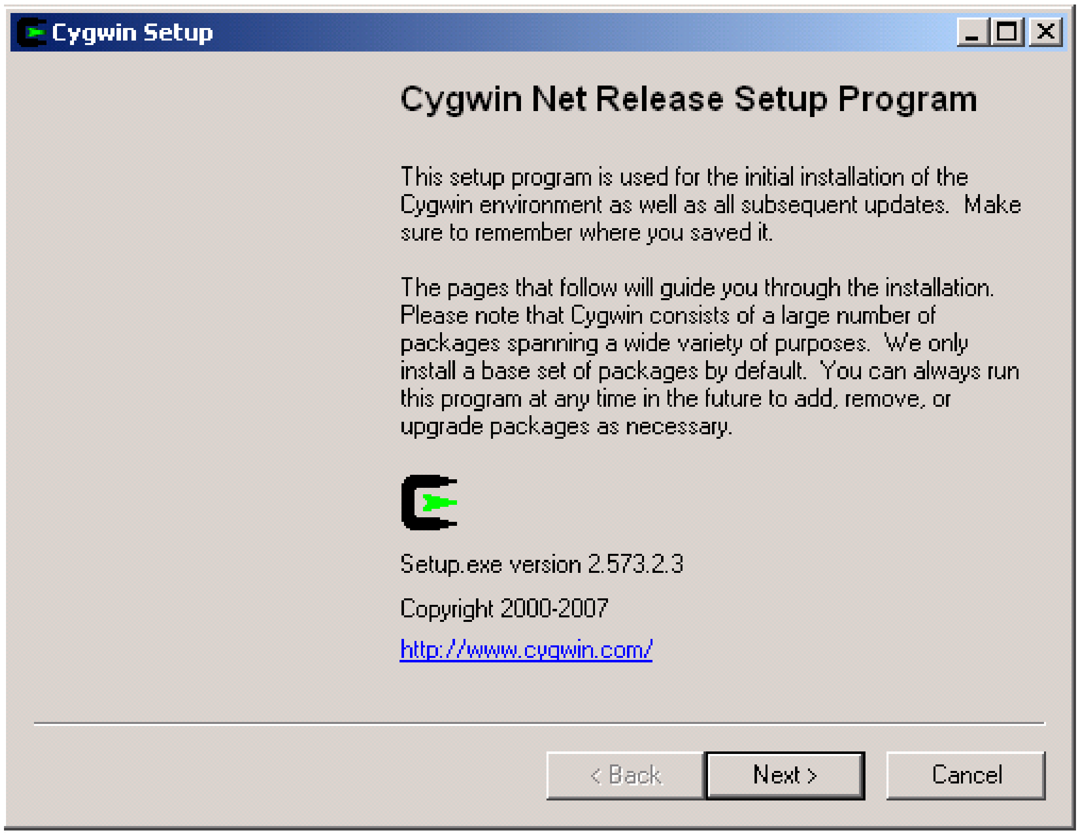
The Flash library implements must follow the existing ones to handle the response callback.

4.4 Installing Cygwin for the ATK

To install Cygwin, use these steps:

1. Download `setup.exe` from http://www.cygwin.com/setup.exe.
2. Run `setup.exe`.

The installation screen is displayed (Figure 4-1).



Cygwin Net Release Setup Program

This setup program is used for the initial installation of the Cygwin environment as well as all subsequent updates. Make sure to remember where you saved it.

The pages that follow will guide you through the installation. Please note that Cygwin consists of a large number of packages spanning a wide variety of purposes. We only install a base set of packages by default. You can always run this program at any time in the future to add, remove, or upgrade packages as necessary.

Setup.exe version 2.573.2.3

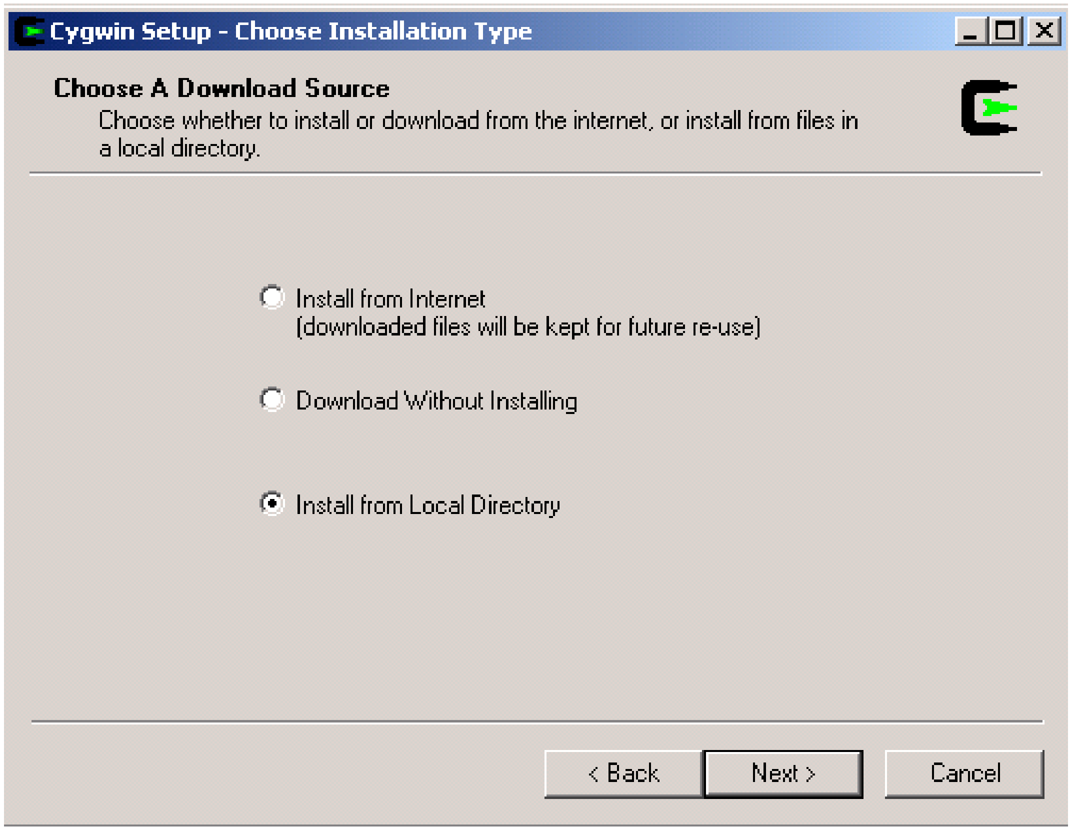
Copyright 2000-2007

http://www.cygwin.com/

Figure 4-1. Installation Setup

3. Click **Next**, and prepare to select the installation method.

The download screen is displayed (Figure 4-2).


Cygwin Setup - Choose Installation Type

Choose A Download Source
Choose whether to install or download from the internet, or install from files in a local directory.

Install from Internet
(downloaded files will be kept for future re-use)

Download Without Installing

[✓ Install from Local Directory]

Figure 4-2. Download Screen

There are three installation methods:

— Install from Internet: Downloads from the Internet and installs immediately.

— Download without Installing: Downloads the installation package to your local directory but does not install it.

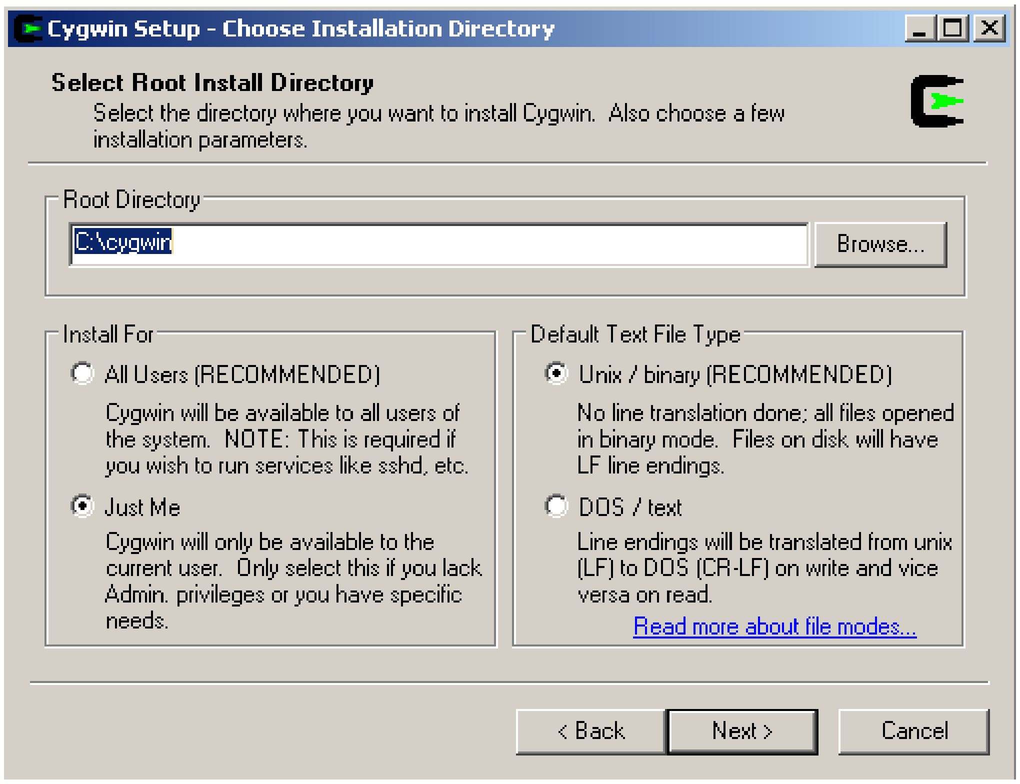
— Install from Local Directory: Does not download the installation package, but allows you to install the package from a local directory that already contains the package.

If you do not yet have the installation package, we recommend that you select **Download Without Installing**, and specify the installation path manually before clicking **Next**.

For the following example, the installation package is in the local directory, so we select **Install from Local Directory** and click **Next** to continue our example setup in step 4.

4. Specify the installation directory.

The Installation Directory screen is displayed (Figure 4-3).



Select Root Install Directory

Select the directory where you want to install Cygwin. Also choose a few installation parameters.

Root Directory: C:\cygwin

Install For

[ ] All Users (RECOMMENDED)

Cygwin will be available to all users of the system. NOTE: This is required if you wish to run services like sshd, etc.

[✓ Just Me]

Cygwin will only be available to the current user. Only select this if you lack Admin. privileges or you have specific needs.

Default Text File Type

[✓ Unix / binary (RECOMMENDED)]

No line translation done; all files opened in binary mode. Files on disk will have LF line endings.

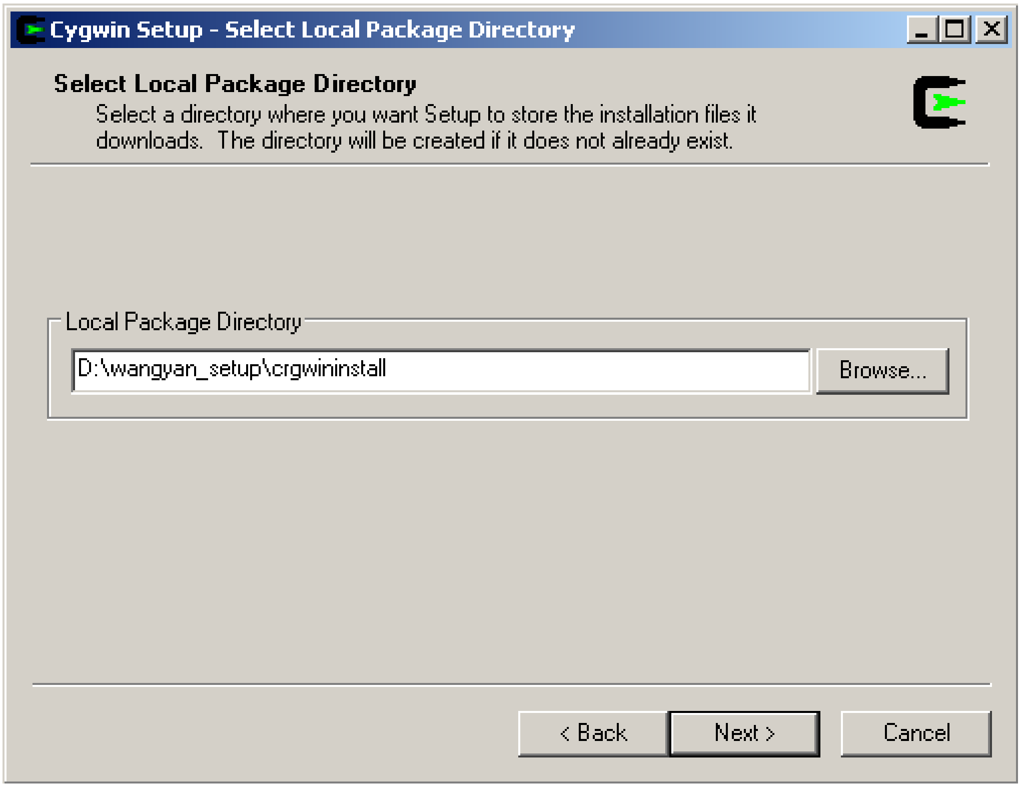
[ ] DOS / text

Line endings will be translated from unix (LF) to DOS (CR-LF) on write and vice versa on read.

Figure 4-3. Installation Directory Screen

5. Select the local Package Directory.

The Local Package Directory screen is displayed (Figure 4-4).


Cygwin Setup - Select Local Package Directory
Select Local Package Directory
Select a directory where you want Setup to store the installation files it downloads. The directory will be created if it does not already exist.

Local Package Directory: D:\wangyan_setup\crgwininstall

Browse...
< Back
Next >
Cancel

Figure 4-4. Local Directory Screen

Because we selected the installation method **Install from Local Directory**, we must specify the local directory.

6. Click **Next**.

The Select Package screen is displayed (Figure 4-5).

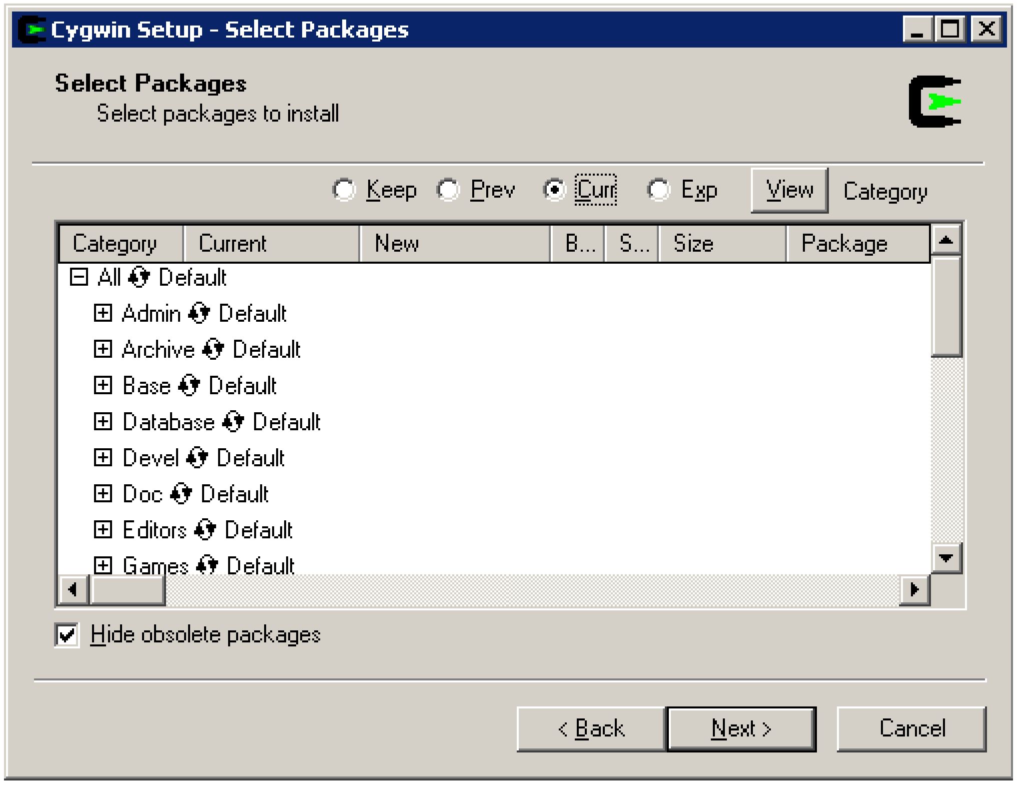


Figure 4-5. Select Package Screen

Options:

– **Default**: installs only the default installation items.

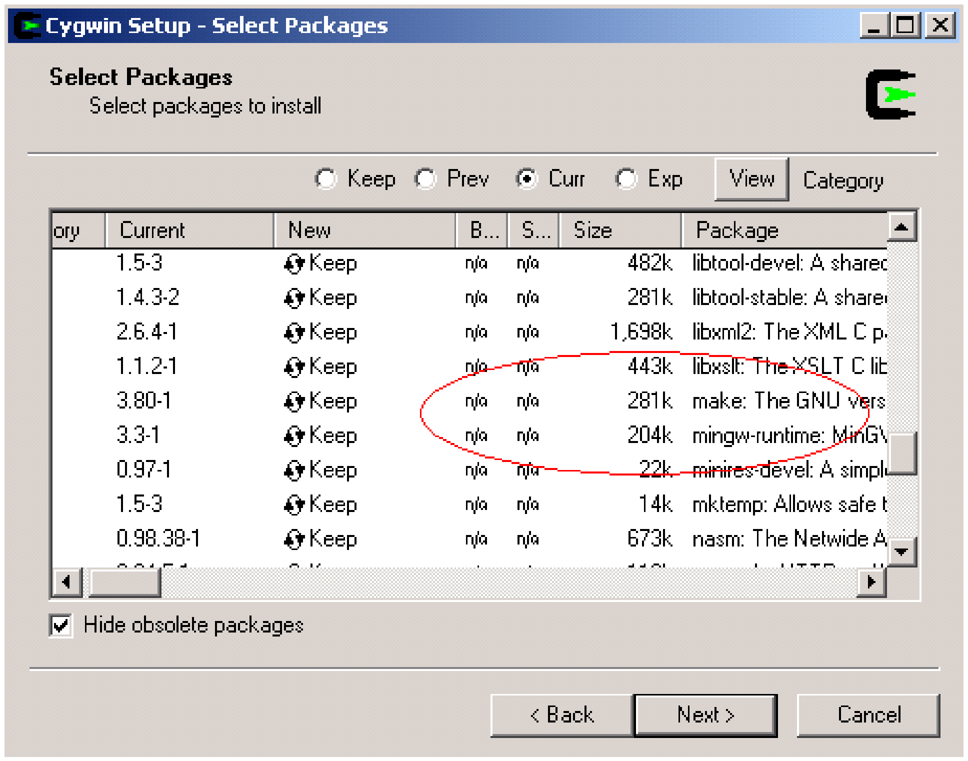
– **Install**: installs all, and requires about 200M space.

– **Reinstall**: Reinstalls the selected items.

– **Uninstall**: Uninstalls the selected items.

Select **Install** to install all.

For the ATK, the **make** option must be selected as “install”. “make” is under the “Devel” as shown in Figure 4-6.


Cygwin Setup - Select Packages

Select Packages
Select packages to install

Keep Prev [✓ Curr] Exp View Category

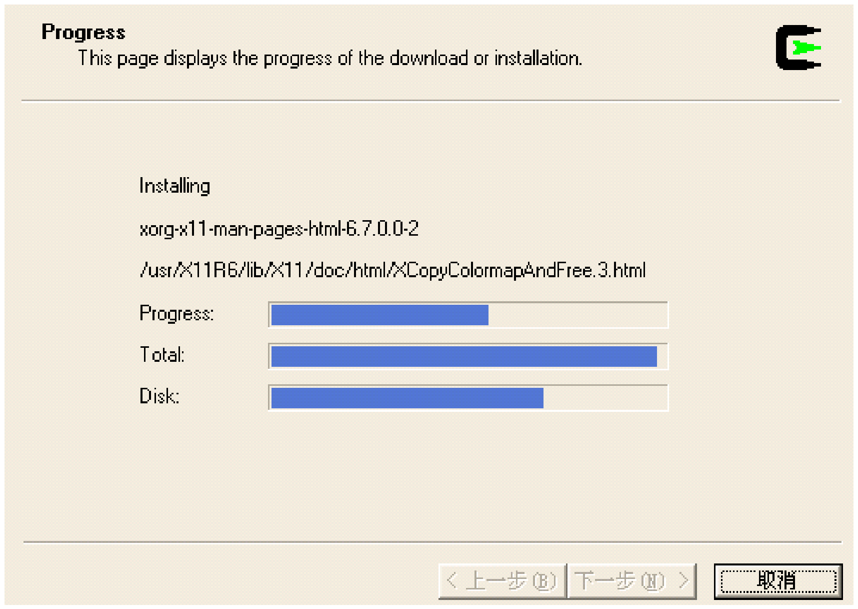
ory	Current	New	B...	S...	Size	Package
	1.5-3	Keep	n/a	n/a	482k	libtool-devel: A sharec
	1.4.3-2	Keep	n/a	n/a	281k	libtool-stable: A share
	2.6.4-1	Keep	n/a	n/a	1,698k	libxml2: The XML C p
	1.1.2-1	Keep	n/a	n/a	443k	libxslt: The XSLT C lit
	3.80-1	Keep	n/a	n/a	281k	make: The GNU vers
	3.3-1	Keep	n/a	n/a	204k	mingw-runtime: MinG\
	0.97-1	Keep	n/a	n/a	22k	minires-devel: A simpl
	1.5-3	Keep	n/a	n/a	14k	mktemp: Allows safe t
	0.98.38-1	Keep	n/a	n/a	673k	nasm: The Netwide A

✓ Hide obsolete packages

< Back Next > Cancel

Figure 4-6. make

7. Click **Next**.
   Installation begins (Figure 4-7).


Progress
This page displays the progress of the download or installation.

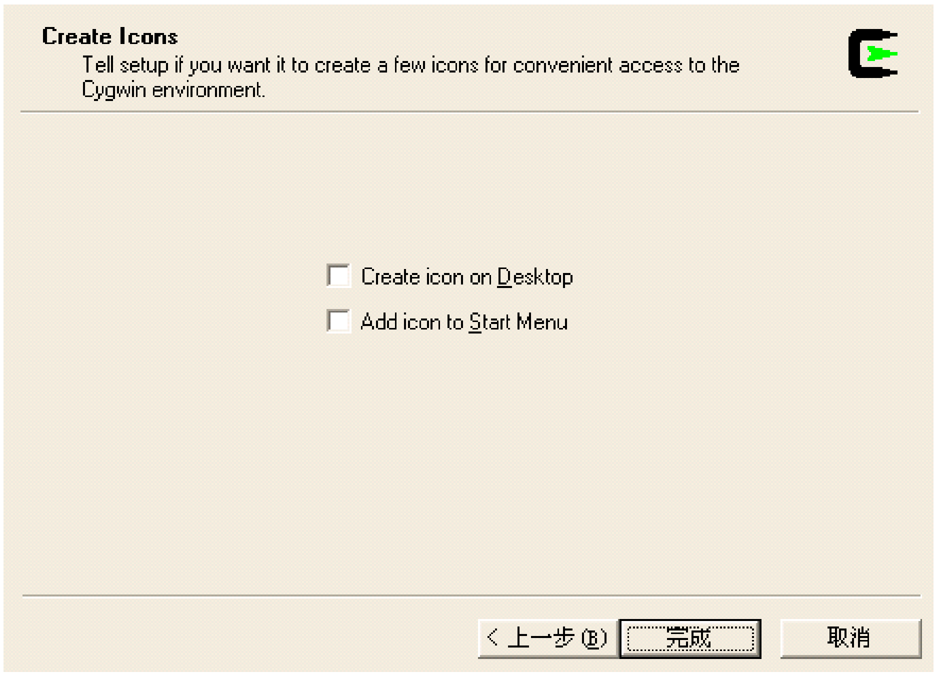
Installing
xorg-x11-man-pages-html-6.7.0.0-2
/usr/X11R6/lib/X11/doc/html/XCopyColormapAndFree.3.html
Progress:
Total:
Disk:

< 上一步 (B) 下一步 (N) > 取消

Figure 4-7. Installation

Installation takes about 30 minutes.

8. The next screen allows you to create icons (Figure 4-8).


Create Icons
Tell setup if you want it to create a few icons for convenient access to the Cygwin environment.

☐ Create icon on Desktop
☐ Add icon to Start Menu

Figure 4-8. Creating Icons

The installation is complete (Figure 4-9).

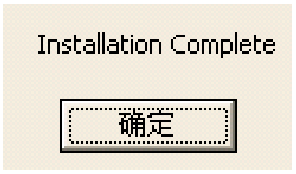

Installation Complete

Figure 4-9. Installed

Installation is successful. You may launch the Cygwin Bash shell and print “which make” to ensure that `make` is installed.