DELGEN

X-Graph Software Module

xgFUP Users Manual
Firmware Upgrader

Version 1.0 – 14th August 2007

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1 Welcome

1.1 Introduction

Due to the unique memory architecture of the X-Graph modules, a flash upgrade utility can be used while the main program is running. No programming cable is needed. The X-Graph firmware upgrader uses a HAL structure and can be used to upgrade the flash contents via any available hardware interface.

IMPORTANT: The X-Graph software license agreement grants you the right to use this library on all X-Graph hardware. It is not allowed to use this X-Graph software module on any other hardware. A software lock mechanism is build-in this library to prevent unauthorized use.

1.2 How This Book Is Organized

You can find following chapters in it:

Chapter 1 contains a view on all the information in this book.

Read **Chapter 2** for all info on the xgFUP X-Graph software module.

1.3 More Questions

If you have questions while using your X-Graph module, check first if the information is available in this book. If you cannot find the answer check the information and forum on the X-graph website (www.x-graph.be). Finally you can also contact your local distributor or the X-Graph technical support by e-mail (techsup@x-graph.be).

This manual includes all available documentation on the X-Graph module. It is strongly advised to download and read documentation on the Rabbit processor, and the OP7200 operating console available from the Rabbit Semiconductor (www.rabbitsemiconductor.com) website. This manual is complimentary to the documentation found on these websites.

2 xgFUP the X-Graph Firmware Upgrader

The firmware of a Rabbit module can be upgraded with the Dynamic C tools. Either the Dynamic C IDE can be used or a Z-World Rabbit Field Utility (RFU). Both tools require that a USB/programming cable is connected to a PC. This system might be too complicated or time-consuming in production environments.

The X-Graph modules hardware design is especially suited for an in-circuit firmware upgrade system. Due to the Rabbit processor memory interface, a new firmware cannot be written to the flash memory while the same flash is being used as program memory. For most RCM modules this is a problem because normally the Flash is used as program memory. Special tricks are required to write an upgrade tool that can only executed from SRAM, a limited resource.

Because the X-Graph modules execute the main application from Fast-SRAM, the Flash memory is not used during normal program execution. Thus it can be easily upgraded without special programming tricks, with minimum end-user knowledge and a minimum risk.

2.1 X-Graph Firmware Upgrader Layers

The xgFUP library uses a dual software layer approach. The backend layer (FUP.LIB) includes the xgFUP kernel, or the Rabbit Upgrade core firmware. This part is not open source and cannot be changed by X-Graph customers. Note that this library can only be used with X-Graph modules, it does not work on other Rabbit hardware.

The frontend layer of the xgFUP library contains the hardware interface firmware for the xgFUP. DELGEN includes with all X-Graph modules, three examples of such xgFUP frontends.

The first one uses the standard Ethernet interface. It requires a pc application that pushes the new firmware to the Rabbit module with Ethernet UDP messages.

The second one loads a new firmware from a memory card (MMC/SD or CF) and writes this to flash memory. The file can be stored on the memory card in the standard FAT file system on a PC.

A third example uses a webserver to upgrade the Rabbit firmware.

Based on these three examples users can write xgFUP frontends fitting their applications hardware. A frontend could be written to download the firmware via RS232C, RS485, FTP, HTTP, PPP, …. Whatever is needed.

2.2 Ethernet xgFUP Frontend

2.2.1 Features of the Ethernet xgFUP Frontend

- Requires only appr. 2kByte of flash memory. You can use the full 512kByte of program memory (min 2kByte) on the X-Graph module.
- Includes a Visual Basic program to download the new firmware to the Rabbit module in a single-step.
- Search function to find all X-Graph modules on the local network.
- Uses the standard hex file generated by the DC Compiler.

2.2.2 Implementing the Ethernet xgFUP

Check the xgraph_jumpstart.c application, the Ethernet FUP is included automatically if the XG_FUP define is enabled.

Using the Ethernet xgFUP frontend requires 5 simple steps:
1. Adjust FUP_ID to a identification string for your application. The default is:
#define FUP_ID " – XGRAPH - " VERSION_SWHW
2. Enable the FUP_STOPIRQ define if you are using any interrupts in your application.
#define FUP_STOPIRQ
3. Call fup_init() before your mainloop starts.
4. Call fup_tick() regularly in your mainloop. Or you can decide to call this function only when the user enables firmware upgrades in your applications user interface.
5. If you use interrupts in your application, you should add a function to halt all interrupts while the firmware upgrade software is running. Add void FUPStopIrq(void) {} to your application and include code to stop all interrupts. Do not use ipset(3) because this will also halt the periodic timer and the watchdog refresh.

The Ethernet xgFUP frontend is installed on every shipped X-Graph module. Ethernet firmware upgrades can be done without using the Dynamic C environment.

To start an upgrade, start the included VB application (EFU.EXE) and follow the on screen instructions.

2.2.3 How to use the Ethernet xgFUP

Figure 1: Ethernet Firmware Upgrader PC Application

- Start the included PC application (Ethernet Firmware Upgrader.exe)
- Press the Search button. If more then one X-Graph module is discovered on the network, select the correct module
- Press the 'Start Upgrade' button and select the hex file with the new firmware

2.3 MMC/SDCard FAT xgFUP Frontend

DELGEN is currently testing this function. It will be available soon.

2.4 HTTP xgFUP Frontend

DELGEN is currently testing this function. It will be available soon.

2.5 Customizing the xgFUP

An interface layer can be designed to upgrade the firmware via any available interface on the XG5000. An example on how to do this, will be included in the next release of this manual.

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Change List

1.0

Initial release