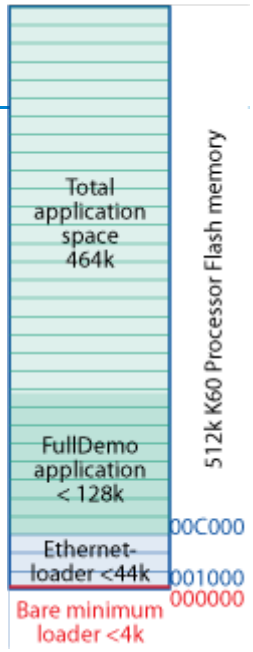
ELZET80 µTasker FullDemo Tutorial

µTasker provides a demo program to show most of its abilities and to provide a guide to programming. Often, the demo source is used as a starting point for the user's program.
While the µTasker demo is made for the Freescale "Tower" evaluation board set, FullDemo is tailored to ELZET80's kBed module on kBedM, with a possible kBedM-4IO extension.
This document deals with the special features and differences between kBed and the documentation for the "Kinetis Tower" as found at http://www.utasker.com/docs/documentation.html .

Boot loader

ELZET80 has a focus on updating not easily accessible devices over the Ethernet. A PC tool (ELZET80 Network Utility) allows to locate devices in a network and to reset them. The comprehensive two-stage µTasker boot loader then enables program download via its own web page into Data Flash and safe exchange and validation. Detail information about the update mechanism can be found on our web site and in the relevant chapter of the Developer's Manual.



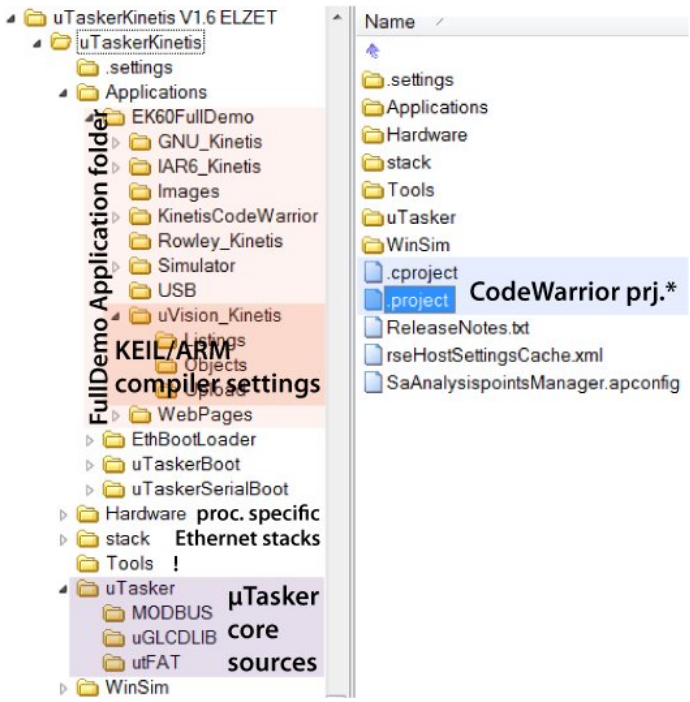
To provide the above functionality, the user application shares the processor memory with the Bare Minimum- and the Ethernet Boot Loader. There are some implications for the application programmer:

- The application starting point is at 0xC000.
- The application may not reset the PHY as it would be necessary for a stand-alone application.
- The debugger fails when single stepping from address 0. Hence, set a breakpoint inside the application and then RUN the debugger to the breakpoint, after which you can switch to single-step safely.

Apart from the 512k processor Flash there is 1MByte data flash available for update program download, web pages etc.

Projects

The uTaskerKinetisV1.6ELZET.zip package contains in the typical "Applications" folder with the EK60FullDemo folder and the two boot loader folders: "uTaskerBoot" for the boot phase 1 Bare Minimum loader and "EthBootLoader" for the phase 2 Ethernet loader.
Project files have been created for both Keil µVision and CodeWarrior to create all necessary files with comprehensive names. Please add your version number to the output files.
There are also projects for uTaskerBoot and EthBootLoader though you should not have to touch these.
*) CodeWarrior needs to place its project files into the topmost directory to be able to access not only the application sources but µTasker sources, too. It then includes ALL sources found such that paths like WinSim have to be excluded.
The easiest way to start your own project for CodeWarrior is to copy the whole uTaskerKinetis tree. Please see the CodeWarrior-10.3-ELZET80.pdf for a detailed tutorial.



File naming conventions

File and project names have the following structure:

```
"application"_"hardware"[-BM][-Upload][" revision"]."fileextension"
```

application	EK60FullDemo | EthBootLoader | uTaskerBoot
hardware	KBED | NETK60
-BM	version to work with boot loader (start address is not 0x0000)
-Upload	Binary (*.bin) for uTasker upload (includes CRC, code & key)
revision	Application Revision (Vx.x)

Examples:

EK60FullDemo_NETK60-BM-Upload_V016.bin	EK60FullDemo for NET-K60, requires BM, *.bin for upload, Revision 1.6
uTaskerBoot_KBED.bin	uTaskerBoot/BM for NET-KBED, *.bin for Programmer
Combined Bootloader_NETK60.bin	uTaskerBoot/BM + EthBootLoader for NET-K60, combined binary for programmer
EthLoader_KBED-BM.axf	EthLoader for NET-KBED, requires BM, *.axf for debugging

kBed Programming Infos:

- Boot sequence has to reset PHY (CPU pin PTA29) before using ext. 50MHz clock (generated in PHY)
- Applications using BM boot loader and external 50MHz clock must not reset PHY (results in clock lost)
- In ELZET80 applications and in Ethernet loader "_BMLOADER" gets defined in the build configurations for boot loader (...Demi_xxx-BM)
- kBed uses CPU ports PTC12 for USB soft connect and PTB22 for Ethernet Interrupt
- CPU Port PTD10 for LED1needs to be configured as open-drain-output as this pin has double use as hardware force-boot detection. To force boot, PTD10 gets connected directly to ground (0V).
- For port initialising, please be aware of the following shorts between port pins that were made to allow an mBed lookalike:

PTD13//PTE10	PTB17//PTE3	PTB3//PTE6
PTD14//PTE11	PTB11//PTE4	PTB4//DAC0
PTD12//PTE12	PTB10//PTE5	PTC14//PTC15
PTD15//PTE7	PTA7//PTE9	
PTB16//PTE2	PTB2//PTE8	

Special define switches in config.h

NET_K60	NET-K60 Hardware (better define this in the build config)
NET_KBED	NET-KBED (kBed) Hardware (better define this in the build config)
KBED_FPGA	NET-KBED Hardwareversion with FPGA (row B module pins modified)
KBEDM_BOARD	kBed is connected to NET-KBEM baseboard
KBEDM_4IO	NET-KBEM Baseboard is connected to NET-KBEDM4i4o extension Board
SUPPORT_NET3A4IO	enables NET-3A4IO (extension board) ADC support on NET-K60
ST7565S_GLCD_MODE	ST7565S (128x64) monochrome GLCD at NET-K60
SPI_LCD	enables ST7565S (128x64) GLCD Demo on SPI1 (KBEDM X5 Connector)
UDPINFO	enables UDP Info- & Settings-Packet support

Define switches in Project-Target(uVision) -BuildConfig(CW10)

_BMLOADER	disable PHY reset Code (required if using BM)
NET_KBED	build for NET-KDED (kBed) hardware
NET_K60	build for NET-K60 hardware

Known problems for demos:

- "Link state LED" state not correct after boot (connection int lost during boot)
- GLCD driver crashes with upload of pictures greater than 128x64 px
- Firmware update hangs while GLCD demo runs on SPI_LCD (processor load too high?)
- Keyboard driver (NET-K60)

EK60FullDemo changes against µTasker TowerDemo

- 1Mbyte SPI Flash on SPI0 for 965k uFileSystem (see file system document)
- resets PHY if stand alone application (without boot loader)
- changed (registers) for KSZ8031RNL PHY and PHY interrupt input pin
- ELZET serial and MAC address stored in CPU OTP area (3 times changeable)
- USB soft connect output pin changes
- NetworkIndicator task changed for combined LNK/ACT LED
- I/O, inputs, outputs and serials defines for different boards
- SD-Card connection defines for different boards
- Background task for external I/O's, ADC's and DAC's
- Demonstrates uTasker graphics on ST7565S (128x64) monochrome GLCD
- ETH-Driver changes for "Magic Reset Frame" support
- New udpPacket task for "Magic Info/Config Frame" support
- new styled web pages wiht additional functions (Analog I/O'...)

EK60FullDemo Revision History

NET-KBED added	001
TESTBED Board config added, uFile gran. for SPI-Flash changed	002
network indicator task changed	003
MXBASE Board config added	004
NET-KBED with FPGA option added (Flexbus Test)	006
NET-KBEDM4IO Board config added for EMC-Test	007
NET-K60 added for first test	008
Magic Frames and DHCP enabled (changes for Bootloader), Keil Opt.3 Fix	009
ADC/DAC added (Background Task from emBasic), ST7565S LCD (Flexbus) added	010
NET-3A4IO support for NET-K60 added (testing I2C-AD-Inputs)	011
Change and fix file system (SPI Flash), ELZET welcome msg, ADC Fix	012
DNS server addr. change added, default user settings changed, ELZET serial Fix	013
ELZET80 icon added, info text changed, SD debug output disabled	014
RTC enabled, new I/O On/Off colors, (new magic number and key for SW update)	015
SPI-LCD added, GLCD Fix, UDP Info- & Settings-Packet support added	016