Developer Study Guide: An introduction to Bluetooth Mesh Networking

Zephyr 1.14 to 2.60 migration notes

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Contents

Revision History

Version	Date	Author	Changes
1.0.0	29th June 2021	Martin Woolley Bluetooth SIG	Initial version.

Zephyr 1.14 to 2.6.0 migration notes

Introduction

The following rough notes were made during the migration of Zephyr code belonging to the educational resource the Bluetooth Mesh Developer Study Guide from Zephyr version 1.14 to version 2.6.0. They're included here in the hope that they be useful to other developers who perhaps choose to migrate code written for Zephyr V1.14 from an earlier version of a Bluetooth SIG developer study guide. We're nice like that at the Bluetooth SIG

The first set of code (which implements models that allow the LED to be switched on and off and its colour changed) is intended to be used on a Nordic Thingy and the second implements client models for on/off and colour control and is intended to be run on a Nordic nRF52840-DK board.

Switching to 2.6.0

```
git pull

git checkout zephyr-v2.6.0
```

Issue 1 - Thingy board name has changed

```
C:\workspaces\zephyr_migration\Light>west build -b nrf52_pca20020
-- west build: generating a build system
-- Application: C:/workspaces/zephyr_migration/Light
-- Zephyr version: 2.6.0 (c:/workspaces/zephyr_source/zephyr), build:
zephyr-v2.6.0
-- Found Python3: C:/python39/python.exe (found suitable exact version
"3.9.2") found components:  Interpreter
-- Found west (found suitable version "0.10.1", minimum required is
"0.7.1")
-- Board: nrf52_pca20020
No board named 'nrf52_pca20020' found.

Please choose one of the following boards:

CMake Error at
C:/workspaces/zephyr_source/zephyr/cmake/app/boilerplate.cmake:407
(message):
  Invalid BOARD; see above.
Call Stack (most recent call first):
  CMakeLists.txt:3 (include)


-- Configuring incomplete, errors occurred!
FATAL ERROR: command exited with status 1: 'C:\Program
Files\CMake\bin\cmake.EXE' '-DWEST_PYTHON=c:\python39\python.exe' '-
BC:\workspaces\zephyr_migration\Light\build' '-
SC:\workspaces\zephyr_migration\Light' -GNinja -DBOARD=nrf52_pca20020
```

Solution

```
C:\workspaces\zephyr_migration\Light>west build -b thingy52_nrf52832
-- west build: generating a build system
-- Application: C:/workspaces/zephyr_migration/Light
-- Zephyr version: 2.6.0 (c:/workspaces/zephyr_source/zephyr), build:
zephyr-v2.6.0
-- Found west (found suitable version "0.10.1", minimum required is
"0.7.1")
-- Board: thingy52_nrf52832
```

Issue 2 - HAS_SEGGER_RTT no longer valid in project config file

```
error: HAS_SEGGER_RTT (defined at drivers/debug/Kconfig.rtt:4) is
assigned in a configuration file,
but is not directly user-configurable (has no prompt). It gets its value
indirectly from other
symbols. See
http://docs.zephyrproject.org/latest/reference/kconfig/CONFIG_HAS_SEGGER_
RTT.html
and/or look up HAS_SEGGER_RTT in the menuconfig/guiconfig interface. The
Application Development
Primer, Setting Configuration Values, and Kconfig - Tips and Best
Practices sections of the manual
might be helpful too.
```

Solution

Remove HAS_SEGGER_RTT from project config file.

Issue 3 - HAS_NORDIC_DRIVERS warnings and more

```
C:\workspaces\zephyr_migration\Light>west build -b thingy52_nrf52832
-- west build: generating a build system
-- Application: C:/workspaces/zephyr_migration/Light
-- Zephyr version: 2.6.0 (c:/workspaces/zephyr_source/zephyr), build:
zephyr-v2.6.0
-- Found west (found suitable version "0.10.1", minimum required is
"0.7.1")
-- Board: thingy52_nrf52832
-- Cache files will be written to:
C:\Users\mwoolley\AppData\Local/.cache/zephyr
-- Found dtc: C:/ProgramData/chocolatey/bin/dtc.exe (found suitable
version "1.4.7", minimum required is "1.4.6")
-- Found toolchain: gnuarmemb (C:/gnu_arm_embedded)
-- Found BOARD.dts:
C:/workspaces/zephyr_source/zephyr/boards/arm/thingy52_nrf52832/thingy52_
nrf52832.dts
-- Generated zephyr.dts:
C:/workspaces/zephyr_migration/Light/build/zephyr/zephyr.dts
-- Generated devicetree_unfixed.h:
C:/workspaces/zephyr_migration/Light/build/zephyr/include/generated/devic
etree_unfixed.h
-- Generated device_extern.h:
C:/workspaces/zephyr_migration/Light/build/zephyr/include/generated/devic
e_extern.h

warning: HAS_NORDIC_DRIVERS (defined at modules\hal_nordic\Kconfig:7) has
direct dependencies 0 with value n, but is currently being y-selected by
the following symbols:
 - SOC_SERIES_NRF52X (defined at
soc/arm/nordic_nrf\nrf52\Kconfig.series:6), with value y, direct
dependencies <choice> (value: y), and select condition <choice> (value:
y)Parsing c:/workspaces/zephyr_source/zephyr/Kconfig
Loaded configuration
'C:/workspaces/zephyr_source/zephyr/boards/arm/thingy52_nrf52832/thingy52
_nrf52832_defconfig'
Merged configuration 'C:/workspaces/zephyr_migration/Light/prj.conf'


warning: HAS_NRFX (defined at modules\hal_nordic\nrfx/Kconfig:4) has
direct dependencies 0 with value n, but is currently being y-selected by
the following symbols:
 - SOC_SERIES_NRF52X (defined at
soc/arm/nordic_nrf\nrf52\Kconfig.series:6), with value y, direct
dependencies <choice> (value: y), and select condition <choice> (value:
y)

warning: NRFX_CLOCK (defined at modules\hal_nordic\nrfx/Kconfig:14) has
direct dependencies HAS_HW_NRF_CLOCK && HAS_NRFX && 0 with value n, but
is currently being y-selected by the following symbols:
 - CLOCK_CONTROL_NRF (defined at drivers/clock_control/Kconfig.nrf:13),
with value y, direct dependencies SOC_COMPATIBLE_NRF && CLOCK_CONTROL
(value: y), and select condition !CLOCK_CONTROL_NRF_FORCE_ALT &&
SOC_COMPATIBLE_NRF && CLOCK_CONTROL (value: y)

warning: NRFX_CLOCK_LFXO_TWO_STAGE_ENABLED (defined at
modules\hal_nordic\nrfx/Kconfig:18) has direct dependencies NRFX_CLOCK &&
HAS_NRFX && 0 with value n, but is currently being y-selected by the
following symbols:
```

```
 - CLOCK_CONTROL_NRF_K32SRC_XTAL (defined at
drivers/clock_control/Kconfig.nrf:36), with value y, direct dependencies
<choice CLOCK_CONTROL_NRF_SOURCE> (value: y), and select condition
!SOC_SERIES_BSIM_NRFXX && !CLOCK_CONTROL_NRF_FORCE_ALT && <choice
CLOCK_CONTROL_NRF_SOURCE> (value: y)

warning: NRFX_GPIOTE (defined at modules\hal_nordic\nrfx/Kconfig:65) has
direct dependencies HAS_HW_NRF_GPIOTE && HAS_NRFX && 0 with value n, but
is currently being y-selected by the following symbols:
 - GPIO_NRFX (defined at drivers/gpio/Kconfig.nrfx:4), with value y,
direct dependencies SOC_FAMILY_NRF && GPIO (value: y), and select
condition SOC_FAMILY_NRF && GPIO (value: y)

warning: NRFX_NVMC (defined at modules\hal_nordic\nrfx/Kconfig:87) has
direct dependencies HAS_NRFX && 0 with value n, but is currently being y-
selected by the following symbols:
 - SOC_FLASH_NRF (defined at drivers/flash/Kconfig.nrf:10), with value y,
direct dependencies SOC_FAMILY_NRF && !FLASH_NRF_FORCE_ALT && FLASH
(value: y), and select condition SOC_FAMILY_NRF && !FLASH_NRF_FORCE_ALT
&& FLASH (value: y)

warning: NRFX_PPI (defined at modules\hal_nordic\nrfx/Kconfig:101,
drivers/serial/Kconfig.nrfx:371) has direct dependencies (HAS_HW_NRF_PPI
&& HAS_NRFX && 0) || (HAS_HW_NRF_PPI && (UART_0_NRF_HW_ASYNC ||
UART_1_NRF_HW_ASYNC || UART_2_NRF_HW_ASYNC || UART_3_NRF_HW_ASYNC) &&
UART_NRFX && SERIAL) with value n, but is currently being y-selected by
the following symbols:
 - UART_ENHANCED_POLL_OUT (defined at drivers/serial/Kconfig.nrfx:388),
with value y, direct dependencies (UART_0_ENHANCED_POLL_OUT ||
UART_1_ENHANCED_POLL_OUT || UART_2_ENHANCED_POLL_OUT ||
UART_3_ENHANCED_POLL_OUT) && UART_NRFX && SERIAL (value: y), and select
condition HAS_HW_NRF_PPI && (UART_0_ENHANCED_POLL_OUT ||
UART_1_ENHANCED_POLL_OUT || UART_2_ENHANCED_POLL_OUT ||
UART_3_ENHANCED_POLL_OUT) && UART_NRFX && SERIAL (value: y)

warning: NRFX_TWIM0 (defined at modules\hal_nordic\nrfx/Kconfig:297) has
direct dependencies HAS_HW_NRF_TWIM0 && HAS_NRFX && 0 with value n, but
is currently being y-selected by the following symbols:
 - I2C_0_NRF_TWIM (defined at drivers/i2c/Kconfig.nrfx:25), with value y,
direct dependencies I2C_NRFX && I2C (value: y), and select condition
I2C_NRFX && I2C (value: y)

warning: NRFX_TWIM1 (defined at modules\hal_nordic\nrfx/Kconfig:302) has
direct dependencies HAS_HW_NRF_TWIM1 && HAS_NRFX && 0 with value n, but
is currently being y-selected by the following symbols:
 - I2C_1_NRF_TWIM (defined at drivers/i2c/Kconfig.nrfx:39), with value y,
direct dependencies I2C_NRFX && I2C (value: y), and select condition
I2C_NRFX && I2C (value: y)

error: Aborting due to Kconfig warnings

CMake Error at C:/workspaces/zephyr_source/zephyr/cmake/kconfig.cmake:264
(message):
  command failed with return code: 1
Call Stack (most recent call first):
  C:/workspaces/zephyr_source/zephyr/cmake/app/boilerplate.cmake:565
(include)
  CMakeLists.txt:3 (include)


-- Configuring incomplete, errors occurred!
```

```
FATAL ERROR: command exited with status 1: 'C:\Program
Files\CMake\bin\cmake.EXE' '-DWEST_PYTHON=c:\python39\python.exe' '-
BC:\workspaces\zephyr_migration\Light\build' '-
SC:\workspaces\zephyr_migration\Light' -GNinja
```

Solution

https://github.com/zephyrproject-rtos/zephyr/issues/31439

Run `west update` then try again

Issue 4 - ZEPHYR_BASE doesn't match CMAKE_CURRENT_SOURCE_DIR

```
CMake Warning at C:/workspaces/zephyr_source/zephyr/CMakeLists.txt:28
(message):
  ZEPHYR_BASE doesn't match CMAKE_CURRENT_SOURCE_DIR

    ZEPHYR_BASE               = c:/workspaces/zephyr_source/zephyr
    PWD                       =
    CMAKE_CURRENT_SOURCE_DIR = C:/workspaces/zephyr_source/zephyr

  You may be using a mix of symbolic links and real paths which causes
subtle
  and hard to debug CMake issues.
```

Solution

Clearly the above is a Windows issue where case is not sensitive in path names. Changing the ZEPHYR_BASE environment variable to match the CMAK variable resolves this issue.

```
ZEPHYR_BASE=C:/workspaces/zephyr_source/zephyr
```

Issue 5 - gpio.h: No such file or directory

```
C:\workspaces\zephyr_migration\Light>west build -b thingy52_nrf52832
[4/179] Building C object CMakeFiles/app.dir/src/main.c.obj
FAILED: CMakeFiles/app.dir/src/main.c.obj
C:\gnu_arm_embedded\bin\arm-none-eabi-gcc.exe -DBUILD_VERSION=zephyr-
v2.6.0 -DKERNEL -DNRF52832_XXAA -D_FORTIFY_SOURCE=2 -D__PROGRAM_START -
D__ZEPHYR__=1 -IC:/workspaces/zephyr_source/zephyr/include -
Izephyr/include/generated -
Ic:/workspaces/zephyr_source/zephyr/soc/arm/nordic_nrf/nrf52 -
IC:/workspaces/zephyr_source/zephyr/subsys/settings/include -
Ic:/workspaces/zephyr_source/zephyr/subsys/bluetooth -
Ic:/workspaces/zephyr_source/zephyr/subsys/bluetooth/controller/ll_sw/nor
dic -IC:/workspaces/zephyr_source/modules/hal/cmsis/CMSIS/Core/Include -
Ic:/workspaces/zephyr_source/modules/hal/nordic/nrfx -
Ic:/workspaces/zephyr_source/modules/hal/nordic/nrfx/drivers/include -
Ic:/workspaces/zephyr_source/modules/hal/nordic/nrfx/mdk -
IC:/workspaces/zephyr_source/zephyr/modules/hal_nordic/nrfx/. -
Ic:/workspaces/zephyr_source/modules/debug/segger/SEGGER -
Ic:/workspaces/zephyr_source/modules/debug/segger/Config -
IC:/workspaces/zephyr_source/zephyr/modules/segger/. -
IC:/workspaces/zephyr_source/modules/crypto/tinycrypt/lib/include -
isystem C:/workspaces/zephyr_source/zephyr/lib/libc/minimal/include -
isystem c:/gnu_arm_embedded/bin/../lib/gcc/arm-none-eabi/7.3.1/include -
isystem c:/gnu_arm_embedded/bin/../lib/gcc/arm-none-eabi/7.3.1/include-
fixed -Os -imacros
C:/workspaces/zephyr_migration/Light/build/zephyr/include/generated/autoc
onf.h -ffreestanding -fno-common -g -fdiagnostics-color=always -
mcpu=cortex-m4 -mthumb -mabi=aapcs -imacros
c:/workspaces/zephyr_source/zephyr/include/toolchain/zephyr_stdint.h -
Wall -Wformat -Wformat-security -Wno-format-zero-length -Wno-main -Wno-
pointer-sign -Wpointer-arith -Wexpansion-to-defined -Wno-unused-but-set-
variable -Werror=implicit-int -fno-asynchronous-unwind-tables -fno-pie -
fno-pic -fno-strict-overflow -fno-reorder-functions -fno-defer-pop -
ffunction-sections -fdata-sections -std=c99 -nostdinc -MD -MT
CMakeFiles/app.dir/src/main.c.obj -MF CMakeFiles\app.dir\src\main.c.obj.d
-o CMakeFiles/app.dir/src/main.c.obj   -c ../src/main.c
../src/main.c:13:10: fatal error: gpio.h: No such file or directory
 #include <gpio.h>
          ^~~~~~~~
compilation terminated.
[13/179] Building C object
zephyr/CMakeFiles/zephyr.dir/lib/os/timeutil.c.obj
ninja: build stopped: subcommand failed.
FATAL ERROR: command exited with status 1: 'C:\Program
Files\CMake\bin\cmake.EXE' --build
'C:\workspaces\zephyr_migration\Light\build'
```

Solution

gpio.h is now in the drivers subdirectory.

```
#include <drivers/gpio.h>
```

Issue 6 - unknown type name 'u16_t' (and others)

```
../src/main.c:25:1: error: unknown type name 'u8_t'
 u8_t onoff_state;
 ^~~~
../src/main.c:27:1: error: unknown type name 'u16_t'
 u16_t hsl_lightness;
```

Solution

These types have been renamed:

```
uint8_t
uint16_t
uint32_t
```

Issue 7 - gpio_pin_write function has been renamed

```
../src/main.c: In function 'thingy_led_on':
../src/main.c:49:2: warning: implicit declaration of function
'gpio_pin_write'; did you mean 'gpio_pin_set'? [-Wimplicit-function-
declaration]
  gpio_pin_write(led_ctrlr, LED_R, r);
```

https://docs.zephyrproject.org/2.6.0/reference/peripherals/gpio.html#api-reference

Solution

Change to use gpio_pin_set per the message.

My 1.14 code looked like this:

```
void thingy_led_on(int r, int g, int b)
{
    // LEDs on Thingy are "active low" so zero means on. Args are express
ed as RGB 0-255 values so we map them to GPIO low/high.
    r = !(r / 255);
    g = !(g / 255);
    b = !(b / 255);

    gpio_pin_write(led_ctrlr, LED_R, r);
    gpio_pin_write(led_ctrlr, LED_G, g);
    gpio_pin_write(led_ctrlr, LED_B, b);
}

void thingy_led_off()
{
      gpio_pin_write(led_ctrlr, LED_R, 1);
      gpio_pin_write(led_ctrlr, LED_G, 1);
      gpio_pin_write(led_ctrlr, LED_B, 1);
}
```

My 2.6.0 code now looks like this:

```
void thingy_led_on(int r, int g, int b)
{
    // LEDs on Thingy are "active low" so zero means on.
    r = !(r / 255);
    g = !(g / 255);
    b = !(b / 255);

    gpio_pin_set(led_ctrlr, LED_R, r);
    gpio_pin_set(led_ctrlr, LED_G, g);
    gpio_pin_set(led_ctrlr, LED_B, b);
}

void thingy_led_off()
{
      gpio_pin_set(led_ctrlr, LED_R, 0);
      gpio_pin_set(led_ctrlr, LED_G, 0);
      gpio_pin_set(led_ctrlr, LED_B, 0);
}
```

Issue 8 - bt_mesh_cfg_srv related errors (many)

```
../src/main.c:309:15: error: variable 'cfg_srv' has initializer but
incomplete type
 static struct bt_mesh_cfg_srv cfg_srv = {
               ^~~~~~~~~~~~~~~
../src/main.c:310:4: error: 'struct bt_mesh_cfg_srv' has no member named
'relay'
    .relay = BT_MESH_RELAY_DISABLED,
     ^~~~~
In file included from
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh.h:20:0,
                 from ../src/main.c:14:
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh/cfg.h:45:45:
warning: excess elements in struct initializer
 #define BT_MESH_RELAY_DISABLED              BT_MESH_FEATURE_DISABLED
                                             ^
../src/main.c:310:12: note: in expansion of macro
'BT_MESH_RELAY_DISABLED'
    .relay = BT_MESH_RELAY_DISABLED,
             ^~~~~~~~~~~~~~~~~~~~~~
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh/cfg.h:45:45:
note: (near initialization for 'cfg_srv')
 #define BT_MESH_RELAY_DISABLED              BT_MESH_FEATURE_DISABLED
                                             ^
../src/main.c:310:12: note: in expansion of macro
'BT_MESH_RELAY_DISABLED'
    .relay = BT_MESH_RELAY_DISABLED,
             ^~~~~~~~~~~~~~~~~~~~~~
../src/main.c:311:4: error: 'struct bt_mesh_cfg_srv' has no member named
'beacon'
    .beacon = BT_MESH_BEACON_DISABLED,
     ^~~~~~
In file included from
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh.h:20:0,
                 from ../src/main.c:14:
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh/cfg.h:49:45:
warning: excess elements in struct initializer
 #define BT_MESH_BEACON_DISABLED             BT_MESH_FEATURE_DISABLED
                                             ^
../src/main.c:311:13: note: in expansion of macro
'BT_MESH_BEACON_DISABLED'
    .beacon = BT_MESH_BEACON_DISABLED,
              ^~~~~~~~~~~~~~~~~~~~~~~
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh/cfg.h:49:45:
note: (near initialization for 'cfg_srv')
 #define BT_MESH_BEACON_DISABLED             BT_MESH_FEATURE_DISABLED
                                             ^
../src/main.c:311:13: note: in expansion of macro
'BT_MESH_BEACON_DISABLED'
    .beacon = BT_MESH_BEACON_DISABLED,
              ^~~~~~~~~~~~~~~~~~~~~~~
../src/main.c:312:4: error: 'struct bt_mesh_cfg_srv' has no member named
'frnd'
    .frnd = BT_MESH_FRIEND_NOT_SUPPORTED,
     ^~~~
In file included from
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh.h:20:0,
                 from ../src/main.c:14:
```

```
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh/cfg.h:58:45:
warning: excess elements in struct initializer
 #define BT_MESH_FRIEND_NOT_SUPPORTED
BT_MESH_FEATURE_NOT_SUPPORTED
                                                         ^
../src/main.c:312:11: note: in expansion of macro
'BT_MESH_FRIEND_NOT_SUPPORTED'
    .frnd = BT_MESH_FRIEND_NOT_SUPPORTED,
            ^~~~~~~~~~~~~~~~~~~~~~~~~~~~
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh/cfg.h:58:45:
note: (near initialization for 'cfg_srv')
 #define BT_MESH_FRIEND_NOT_SUPPORTED
BT_MESH_FEATURE_NOT_SUPPORTED
                                                         ^
../src/main.c:312:11: note: in expansion of macro
'BT_MESH_FRIEND_NOT_SUPPORTED'
    .frnd = BT_MESH_FRIEND_NOT_SUPPORTED,
            ^~~~~~~~~~~~~~~~~~~~~~~~~~~~
../src/main.c:313:4: error: 'struct bt_mesh_cfg_srv' has no member named
'gatt_proxy'
    .gatt_proxy = BT_MESH_GATT_PROXY_ENABLED,
     ^~~~~~~~~~
In file included from
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh.h:20:0,
                 from ../src/main.c:14:
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh/cfg.h:53:45:
warning: excess elements in struct initializer
 #define BT_MESH_GATT_PROXY_ENABLED          BT_MESH_FEATURE_ENABLED
                                                     ^
../src/main.c:313:17: note: in expansion of macro
'BT_MESH_GATT_PROXY_ENABLED'
    .gatt_proxy = BT_MESH_GATT_PROXY_ENABLED,
                  ^~~~~~~~~~~~~~~~~~~~~~~~~~
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh/cfg.h:53:45:
note: (near initialization for 'cfg_srv')
 #define BT_MESH_GATT_PROXY_ENABLED          BT_MESH_FEATURE_ENABLED
                                                     ^
../src/main.c:313:17: note: in expansion of macro
'BT_MESH_GATT_PROXY_ENABLED'
    .gatt_proxy = BT_MESH_GATT_PROXY_ENABLED,
                  ^~~~~~~~~~~~~~~~~~~~~~~~~~
../src/main.c:314:4: error: 'struct bt_mesh_cfg_srv' has no member named
'default_ttl'
    .default_ttl = 7,
     ^~~~~~~~~~
../src/main.c:314:18: warning: excess elements in struct initializer
    .default_ttl = 7,
                   ^
../src/main.c:314:18: note: (near initialization for 'cfg_srv')
../src/main.c:316:4: error: 'struct bt_mesh_cfg_srv' has no member named
'net_transmit'
    .net_transmit = BT_MESH_TRANSMIT(2, 20),
     ^~~~~~~~~~~~
In file included from
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh.h:18:0,
                 from ../src/main.c:14:
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh/access.h:278:41
: warning: excess elements in struct initializer
 #define BT_MESH_TRANSMIT(count, int_ms) ((count) | (((int_ms / 10) - 1)
<< 3))
                                                         ^
```

```
../src/main.c:316:19: note: in expansion of macro 'BT_MESH_TRANSMIT'
   .net_transmit = BT_MESH_TRANSMIT(2, 20),
                   ^~~~~~~~~~~~~~~~
C:/workspaces/zephyr_source/zephyr/include/bluetooth/mesh/access.h:278:41
: note: (near initialization for 'cfg_srv')
 #define BT_MESH_TRANSMIT(count, int_ms) ((count) | (((int_ms / 10) - 1)
<< 3))
                                                    ^
../src/main.c:316:19: note: in expansion of macro 'BT_MESH_TRANSMIT'
   .net_transmit = BT_MESH_TRANSMIT(2, 20),
                   ^~~~~~~~~~~~~~~~
../src/main.c:332:24: error: expected '}' before '(' token
   BT_MESH_MODEL_CFG_SRV(&cfg_srv),
```

My code:

```
// Configuration Server
// --------------------
static struct bt_mesh_cfg_srv cfg_srv = {
            .relay = BT_MESH_RELAY_DISABLED,
            .beacon = BT_MESH_BEACON_DISABLED,
            .frnd = BT_MESH_FRIEND_NOT_SUPPORTED,
            .gatt_proxy = BT_MESH_GATT_PROXY_ENABLED,
            .default_ttl = 7,
            /* 3 transmissions with 20ms interval */
            .net_transmit = BT_MESH_TRANSMIT(2, 20),
};

static struct bt_mesh_model sig_models[] = {
            BT_MESH_MODEL_CFG_SRV(&cfg_srv),
            BT_MESH_MODEL_HEALTH_SRV(&health_srv, &health_pub),
            BT_MESH_MODEL(BT_MESH_MODEL_ID_GEN_ONOFF_SRV,
generic_onoff_op,
                                            &generic_onoff_pub,
NULL),
            BT_MESH_MODEL(BT_MESH_MODEL_ID_LIGHT_HSL_SRV, light_hsl_op,
                                            &light_hsl_pub,
NULL),
};
```

This structure was deprecated at 2.5.0:

```
 * The ``bt_mesh_cfg_srv`` structure has been deprecated in favor of a
   standalone Heartbeat API and Kconfig entries for default state
values.
```

Solution

These flags and parameters are now specified in the project configuration.

```
CONFIG_BT_MESH_RELAY=n
CONFIG_BT_MESH_FRIEND=n
CONFIG_BT_MESH_GATT_PROXY=y
CONFIG_BT_MESH_BEACON_ENABLED=n
```

BT_MESH_MODEL_CFG_SRV no longer takes a parameter:

```
static struct bt_mesh_model sig_models[] = {
            BT_MESH_MODEL_CFG_SRV,
            BT_MESH_MODEL_HEALTH_SRV(&health_srv, &health_pub),
            BT_MESH_MODEL(BT_MESH_MODEL_ID_GEN_ONOFF_SRV,
generic_onoff_op,
                                                  &generic_onoff_pub,
NULL),
            BT_MESH_MODEL(BT_MESH_MODEL_ID_LIGHT_HSL_SRV, light_hsl_op,
                                                  &light_hsl_pub,
NULL),
};
```

Obviously these and the other config params (TTL, net transmit) can be set by the config client.

Issue 9 - incompatible type for argument 1 of 'k_sleep'

```
../src/main.c: In function 'indicate_provisioned':
../src/main.c:387:13: error: incompatible type for argument 1 of
'k_sleep'
    k_sleep(250);
```

API was

```
s32_t k_sleep(s32_t duration)
```

```
void indicate_provisioned() {
    int r = 0, g = 255, b = 0;
    thingy_led_on(r, g, b);
    k_sleep(250);
    r = 0, g = 0, b = 0;
    thingy_led_on(r, g, b);
}
```

Solution

API is now

```
int32_t k_sleep(k_timeout_t timeout)
```
https://docs.zephyrproject.org/2.6.0/reference/kernel/timing/clocks.html?highlight=k_timeout_t

k_timeout_t is an opaque struct type that must be initialized using one of a family of kernel timeout macros. The most common, K_MSEC , defines a time in milliseconds after the current time (strictly: the time at which the kernel receives the timeout value).

```
void indicate_provisioned() {
    int r = 0, g = 255, b = 0;
    thingy_led_on(r, g, b);
    k_sleep(K_MSEC(250));
    r = 0, g = 0, b = 0;
    thingy_led_on(r, g, b);
}
```

Issue 10 - device_get_binding(PORT)

```
CMakeFiles/app.dir/src/main.c.obj   -c ../src/main.c
../src/main.c: In function 'configure_thingy_led_controller':
../src/main.c:440:12: warning: assignment discards 'const' qualifier from
pointer target type [-Wdiscarded-qualifiers]
  led_ctrlr = device_get_binding(PORT);
```

```
struct device *led_ctrlr;

static void configure_thingy_led_controller()
{
      led_ctrlr = device_get_binding(PORT);
      gpio_pin_configure(led_ctrlr, LED_R, GPIO_DIR_OUT);
      gpio_pin_configure(led_ctrlr, LED_G, GPIO_DIR_OUT);
      gpio_pin_configure(led_ctrlr, LED_B, GPIO_DIR_OUT);
}
```

1.14 API is

```
struct device *device_get_binding(const char *name)
```

Solution

API is

```
const struct device* device_get_binding(const char*name)
```

So the assignment must be to a const.

```
const struct device *led_ctrlr;

static void configure_thingy_led_controller()
{
      led_ctrlr = device_get_binding(PORT);
```

Issue 11 - 'GPIO_DIR_OUT' undeclared | 'GPIO_DIR_IN' undeclared

```
../src/main.c:441:39: error: 'GPIO_DIR_OUT' undeclared (first use in this
function); did you mean 'GPIO_INPUT'?
  gpio_pin_configure(led_ctrlr, LED_R, GPIO_DIR_OUT);
                                       ^~~~~~~~~~~~
                                       GPIO_INPUT
```

```
static void configure_thingy_led_controller()
{
     led_ctrlr = device_get_binding(PORT);
     gpio_pin_configure(led_ctrlr, LED_R, GPIO_DIR_OUT);
     gpio_pin_configure(led_ctrlr, LED_G, GPIO_DIR_OUT);
     gpio_pin_configure(led_ctrlr, LED_B, GPIO_DIR_OUT);
}
```

Solution

```
static void configure_thingy_led_controller()
{
     led_ctrlr = device_get_binding(PORT);
     gpio_pin_configure(led_ctrlr, LED_R, GPIO_OUTPUT);
     gpio_pin_configure(led_ctrlr, LED_G, GPIO_OUTPUT);
     gpio_pin_configure(led_ctrlr, LED_B, GPIO_OUTPUT);
}

// and...

     gpio_pin_configure(gpio_port1, BUTTON1, GPIO_INPUT | GPIO_INT |
PULL_UP | EDGE);
```

Issue 12 - nRF52840_PCA10056 board name has changed

```
C:\workspaces\zephyr_migration\Switch>west build -b nRF52840_PCA10056
-- west build: generating a build system
-- Application: C:/workspaces/zephyr_migration/Switch
-- Zephyr version: 2.6.0 (C:/workspaces/zephyr_source/zephyr), build:
zephyr-v2.6.0
-- Found Python3: C:/python39/python.exe (found suitable exact version
"3.9.2") found components:  Interpreter
-- Found west (found suitable version "0.10.1", minimum required is
"0.7.1")
-- Board: nRF52840_PCA10056
No board named 'nRF52840_PCA10056' found.

Please choose one of the following boards:

CMake Error at
C:/workspaces/zephyr_source/zephyr/cmake/app/boilerplate.cmake:407
(message):
  Invalid BOARD; see above.
Call Stack (most recent call first):
  CMakeLists.txt:3 (include)


-- Configuring incomplete, errors occurred!
FATAL ERROR: command exited with status 1: 'C:\Program
Files\CMake\bin\cmake.EXE' '-DWEST_PYTHON=c:\python39\python.exe' '-
BC:\workspaces\zephyr_migration\Switch\build' '-
SC:\workspaces\zephyr_migration\Switch' -GNinja -DBOARD=nRF52840_PCA10056
```

Solution

New name is nrf52840dk_nrf52840

```
C:\workspaces\zephyr_migration\Switch>west build -b nrf52840dk_nrf52840
-- west build: generating a build system
-- Application: C:/workspaces/zephyr_migration/Switch
-- Zephyr version: 2.6.0 (C:/workspaces/zephyr_source/zephyr), build:
zephyr-v2.6.0
-- Found west (found suitable version "0.10.1", minimum required is
"0.7.1")
-- Board: nrf52840dk_nrf52840
-- Cache files will be written to:
C:\Users\mwoolley\AppData\Local\.cache/zephyr
-- Found dtc: C:/ProgramData/chocolatey/bin/dtc.exe (found suitable
version "1.4.7", minimum required is "1.4.6")
-- Found toolchain: gnuarmemb (C:/gnu_arm_embedded)
-- Found BOARD.dts:
C:/workspaces/zephyr_source/zephyr/boards/arm/nrf52840dk_nrf52840/nrf5284
0dk_nrf52840.dts
-- Generated zephyr.dts:
C:/workspaces/zephyr_migration/Switch/build/zephyr/zephyr.dts
-- Generated devicetree_unfixed.h:
C:/workspaces/zephyr_migration/Switch/build/zephyr/include/generated/devi
cetree_unfixed.h
-- Generated device_extern.h:
C:/workspaces/zephyr_migration/Switch/build/zephyr/include/generated/devi
ce_extern.h
```

Issue 13 - undefined symbol BT_DISCARDABLE_BUF_COUNT

```
C:/workspaces/zephyr_migration/Switch/prj.conf:18: warning: attempt to
assign the value '3' to the undefined symbol BT_DISCARDABLE_BUF_COUNT
```

Solution

Deleted from project config. Wasn't really needed anyway.

Issue 14 - undefined symbol BT_MESH_RX_SDU_MAX

```
C:/workspaces/zephyr_migration/Switch/prj.conf:34: warning: attempt to
assign the value '36' to the undefined symbol BT_MESH_RX_SDU_MAX
```

Solution

Deleted from project config. Wasn't really needed anyway.

Issue 15 - undefined symbol BT_RX_BUF_COUNT

```
C:/workspaces/zephyr_migration/Switch/prj.conf:17: warning: attempt to
assign the value '3' to the undefined symbol BT_RX_BUF_COUNT
```

Solution

Deleted from project config. Wasn't really needed anyway.

Issue 16 - misc/printk.h: No such file or directory

```
../src/main.c:8:10: fatal error: misc/printk.h: No such file or directory
 #include <misc/printk.h>
          ^~~~~~~~~~~~~~~
compilation terminated.
```

Solution

That #include is no longer required so deleted.

Issue 17 - 'LED0_GPIO_PIN' undeclared and other GPIO constant problems

```
../src/main.c: In function 'ledOn':
../src/main.c:52:14: error: 'LED0_GPIO_PIN' undeclared (first use in this
function); did you mean 'DT_GPIO_PIN'?
 #define LED0 LED0_GPIO_PIN
```

Solution

```
// GPIO for LED 0
struct device *gpio_led_port;
#define LED_PORT "GPIO_P0"
#define LED0_NODE DT_ALIAS(led0)
#define LED0      DT_GPIO_LABEL(LED0_NODE, gpios)
#define LED_PIN   DT_GPIO_PIN(LED0_NODE, gpios)
#define FLAGS     DT_GPIO_FLAGS(LED0_NODE, gpios)


void ledOn(void) {
      gpio_pin_set(gpio_led_port, LED_PIN, 1);
}

void ledOff(void) {
      gpio_pin_set(gpio_led_port, LED_PIN, 0);
}
```

Issue 18 - GPIO buttons - various build issues

```
../src/main.c: In function 'configureButtons':
../src/main.c:15:15: error: 'SW0_GPIO_CONTROLLER' undeclared (first use
in this function); did you mean 'DT_GPIO_CTLR'?
 #define PORT1 SW0_GPIO_CONTROLLER

// and more
```

Lots of issues here.

In addition to build issues, the logical on/off which is now supposed to take into account the active low/active high property of the board in its DTS did not work for me so I continued to expicitly invert 1s and 0s for Thingy.

Solution

I replaced my code with fragments taken from zephyr's samples/button project.