

高溫提醒

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GATT 服務實作方式

- 周邊(Peripheral) : Nordic nRF52 DK
- 中心(Central) : android BLE GATT

```
public void scanDevice(final boolean enable) {  
    if (enable) {  
        mHandler.postDelayed(() -> {  
            mScanning = false;  
            mBluetoothLeScanner.stopScan(mScanCallback);  
            getActivity().invalidateOptionsMenu();  
        }, SCAN_PERIOD);  
  
        mScanning = true;  
        mBluetoothLeScanner.startScan(mScanCallback);  
    } else {  
        mScanning = false;  
        mBluetoothLeScanner.stopScan(mScanCallback);  
    }  
    getActivity().invalidateOptionsMenu();  
}
```

Android 模擬BLE周邊

- 發出廣播

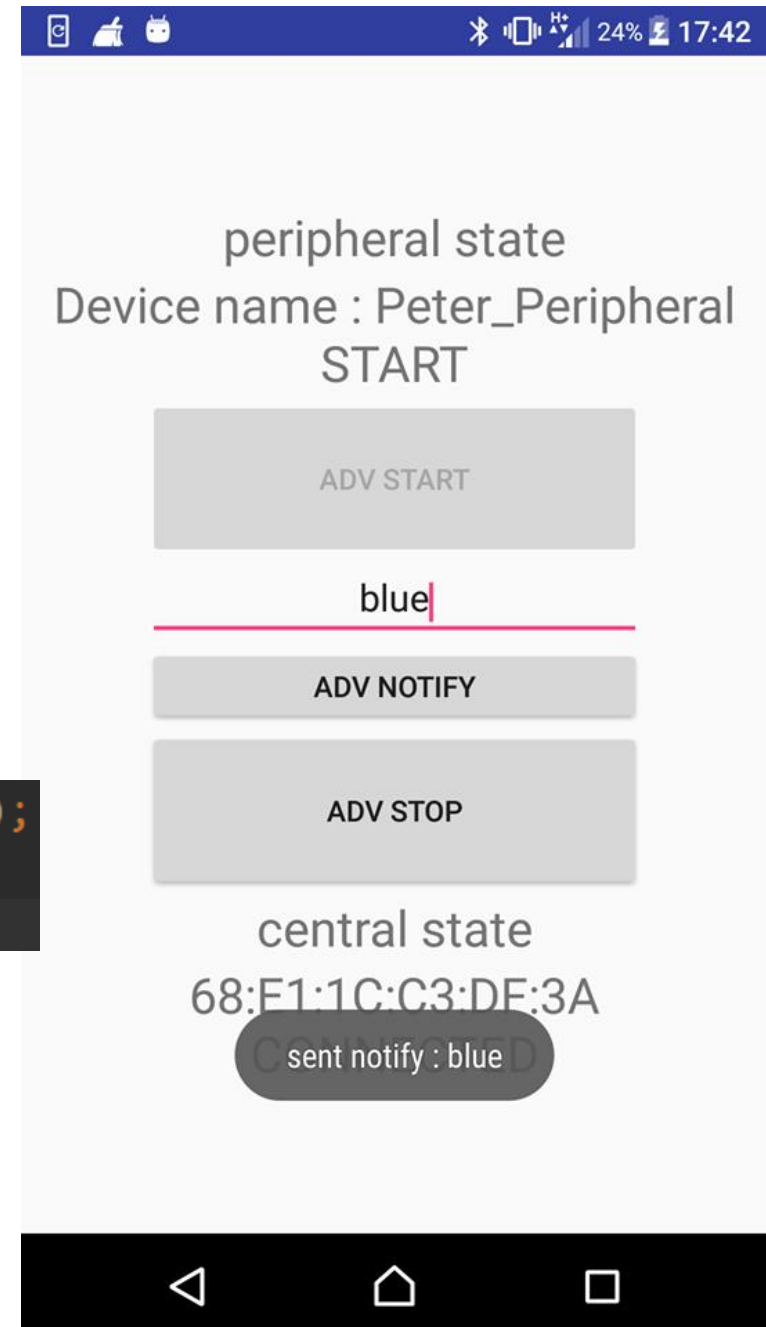
```
mBluetoothLeAdvertiser.startAdvertising(  
    createAdvSettings(true, 0),  
    createAdvertiseData(),  
    mAdvertiseCallback);
```

- 傳送資料

```
characterNotify.setValue(adv_notify_text.getText().toString());  
gattServer.notifyCharacteristicChanged(  
    bluetoothDevice, characterNotify, false);
```

- 停止廣播

```
mBluetoothLeAdvertiser.stopAdvertising(mAdvertiseCallback);
```



GATT 服務提供

- nRF5 溫度測量
- 每秒確認是否更新數據
- 每傳六次把溫度加上120
- 測試提醒功能

```
nt32_t old_temperature = -1;
nt32_t i = 0;
nt32_t test = 3;
static void timer_timeout_handler(void * p_context)

// OUR_JOB: Step 3.F, Update temperature and characteristic value.
int32_t temperature = 0;

sd_temp_get(&temperature);
i++;
if(i>=6){
    temperature+=30*4;
    i=0;
}
if(old_temperature != temperature){
    //temperature=temperature/4;
    SEGGER_RTT_printf(0, "temperature_value: %d\n", temperature);

    our_temperature_characteristic_update(&m_our_service, &temperature);
    nrf_gpio_pin_toggle(LED_4);
    old_temperature = temperature;
}
```

周邊與手機認證

- 板子上用just work做bonding

Just Works bonding:

```
sec_param.bond = true;
sec_param.mitm = false;
sec_param.lesc = 0;
sec_param.keypress = 0;
sec_param.io_caps = BLE_GAP_IO_CAPS_NONE;
sec_param.oob = false;
sec_param.min_key_size = 7;
sec_param.max_key_size = 16;
sec_param.kdist_own.enc = 1;
sec_param.kdist_own.id = 1;
sec_param.kdist_peer.enc = 1;
sec_param.kdist_peer.id = 1;
```

```
static void peer_manager_init(bool erase_bonds)
{
    ble_gap_sec_params_t sec_param;
    ret_code_t err_code;
    err_code = pm_init();
    APP_ERROR_CHECK(err_code);
    if (erase_bonds)
    {
        err_code = pm_peers_delete();
        APP_ERROR_CHECK(err_code);
    }
    memset(&sec_param, 0, sizeof(ble_gap_sec_params_t));
    //http://infocenter.nordicsemi.com/index.jsp?topic=%2Fc
    // Security parameters to be used for all security proc
    sec_param.bond = SEC_PARAM_BOND;
    sec_param.mitm = SEC_PARAM_MITM;
    // sec_param.lesc = SEC_PARAM_LESC;
    // sec_param.keypress = SEC_PARAM_KEYPRESS;
    sec_param.io_caps = SEC_PARAM_IO_CAPABILITIES;
    sec_param.oob = SEC_PARAM_OOB;
    sec_param.min_key_size = SEC_PARAM_MIN_KEY_SIZE;
    sec_param.max_key_size = SEC_PARAM_MAX_KEY_SIZE;
    sec_param.kdist_own.enc = 1;
    sec_param.kdist_own.id = 1;
    sec_param.kdist_peer.enc = 1;
    sec_param.kdist_peer.id = 1;

    err_code = pm_sec_params_set(&sec_param);
    APP_ERROR_CHECK(err_code);

    err_code = pm_register(pm_evt_handler);
    APP_ERROR_CHECK(err_code);
    SEGGER_RTT_WriteString(0, "Bonding-Just Work Bonding\n")
}
```

手機與周邊認證(cont.)

- 手機上用createBond

```
static public boolean createBond(Class btClass, BluetoothDevice btDevice) throws Exception {  
    Method createBondMethod = btClass.getMethod("createBond");  
    Boolean returnValue = (Boolean) createBondMethod.invoke(btDevice);  
    return returnValue.booleanValue();  
}
```

- 第一次bond的時候需要先把版子上的pair先註解掉
- bond一次後，之後connect就會使用bond過的資訊，不用再重新
- bond如果在手機上解除與板子的bond，需要重新燒錄softdevice

MITM(men-in-the-middle)

- Nordic nRF52

Attr用防止MITM

```
BLE_GAP_CONN_SEC_MODE_SET_ENC_NO_MITM(&attr_md.read_perm);  
BLE_GAP_CONN_SEC_MODE_SET_ENC_NO_MITM(&attr_md.write_perm);
```

cccd用防止MITM時，無法成功.....?

```
ble_gatts_attr_md_t cccd_md;  
memset(&cccd_md, 0, sizeof(cccd_md));  
cccd_md.vloc = BLE_GATTS_VLOC_STACK;  
char_md.p_cccd_md = &cccd_md;  
char_md.char_props.notify = 1; //Enable notification by setting the notify property bit.  
BLE_GAP_CONN_SEC_MODE_SET_OPEN(&cccd_md.read_perm);  
BLE_GAP_CONN_SEC_MODE_SET_OPEN(&cccd_md.write_perm);  
//BLE_GAP_CONN_SEC_MODE_SET_ENC_NO_MITM(&cccd_md.read_perm);  
//BLE_GAP_CONN_SEC_MODE_SET_ENC_NO_MITM(&cccd_md.write_perm);
```

自訂的服務

- 溫度服務

```
#define BLE_UUID_OUR_BASE_UUID      {0x23, 0xD1, 0x13, 0xEF, 0x5F, 0x78, 0x23, 0x15, 0xDE, 0xEF, 0x12, 0x12, 0x00, 0x00, 0x00, 0x00} // 128-bit base UUID
#define BLE_UUID_OUR_SERVICE        0xABCD // Just a random, but recognizable value

// ALREADY_DONE_FOR_YOU: Defining 16-bit characteristic UUID
#define BLE_UUID_OUR_CHARACTERISTIC_UUID 0xBEEF // Just a random, but recognizable value
```

```
public static String Padding="0000";
public static String BASE_UUID="-1212-efde-1523-785fef13d123";
public static String Temperature_Service_uuid="abcd";
public static String Temperature_Characteristic_uuid="beef";
public static String cccd_uuid="2902";
public static String Temperature_Service=Padding+Temperature_Service_uuid+BASE_UUID;
public static String Temperature_Characteristic=Padding+Temperature_Characteristic_uuid+BASE_UUID;
public static String cccd=Padding+cccd_uuid+BASE_UUID;
```


🔍 搜尋應用程式

