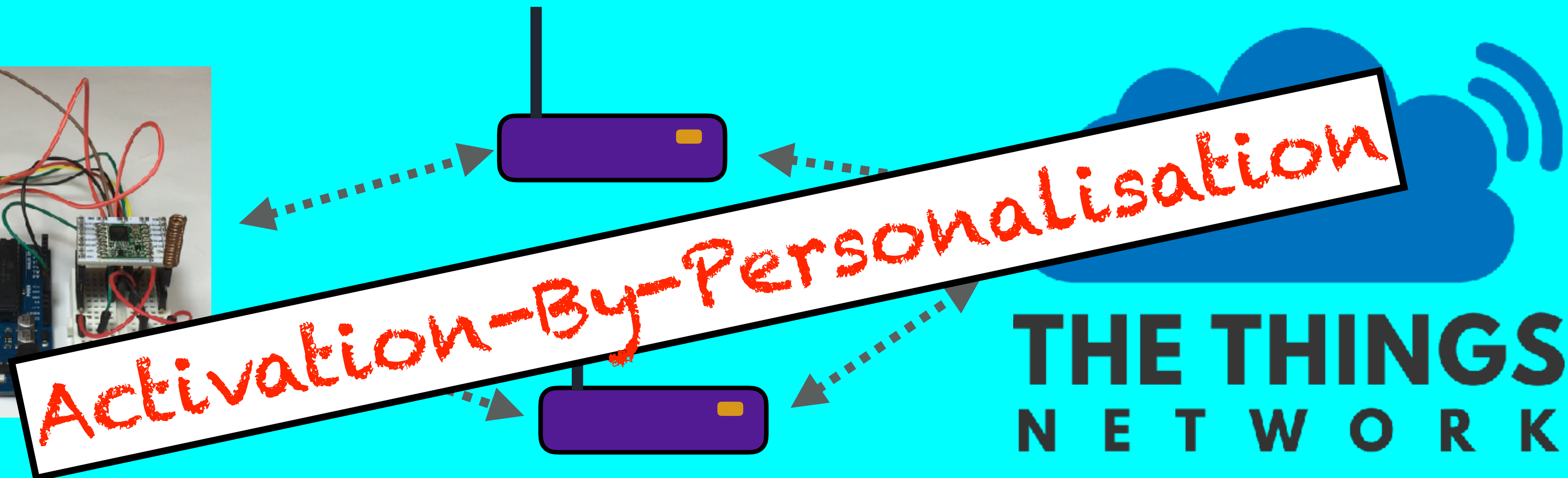
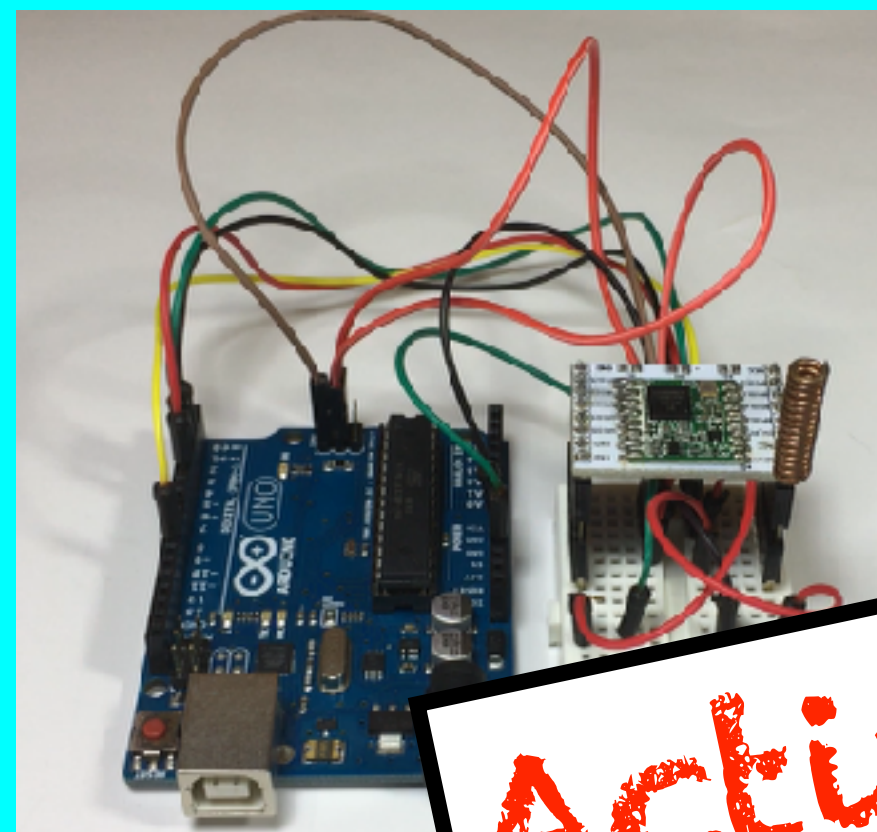


LORA / LORAWAN TUTORIAL 24

ABP Demonstration With The Things Network



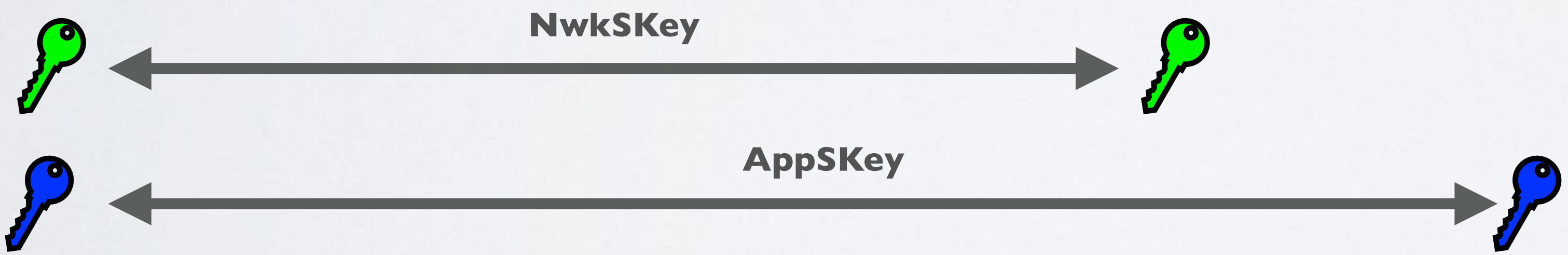
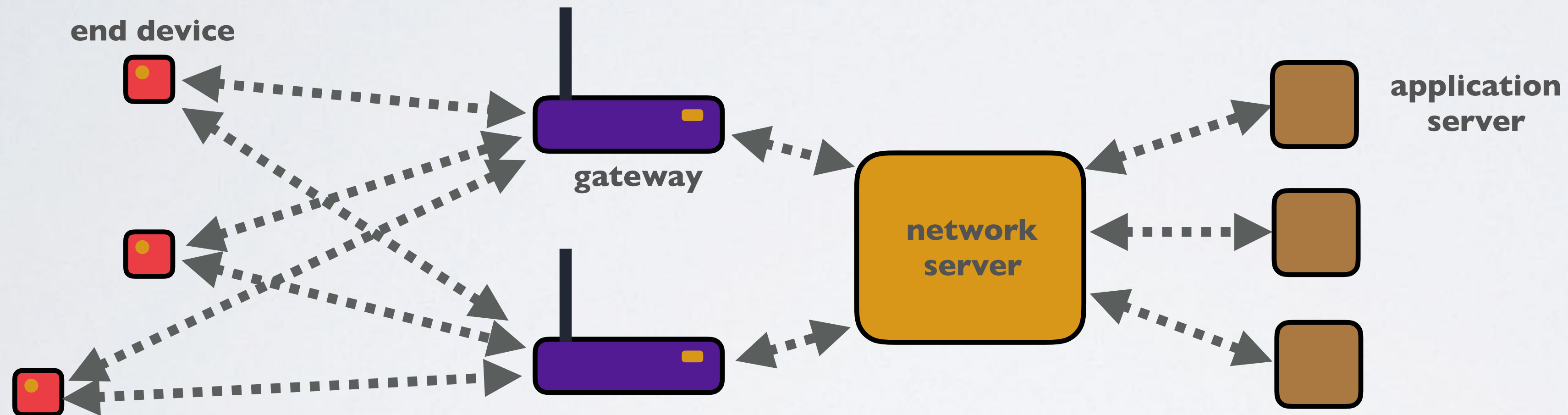
INTRO

- In this tutorial I will demonstrate the Activation-By-Personalisation method.

DEMONSTRATION

- I assume you have watched Tutorial 22 and based on what I have done in Tutorial 22, I will continue where I left off in that video.
- Make sure a LoRa gateway is in your area and your LoRa end device can send messages to that gateway.
- In Tutorial 21 I have explained the difference between Over-The-Air-Activation (OTAA) and Activation-By-Personalisation (ABP).

ABP



DEMONSTRATION

- On TTN, select application: youtube_demo_app
- On TTN, register a device:
Device ID: youtube_demo_device2
Device EUI: 603252361D4B9C66 (Enter a **random value** consisting of 8 bytes)
You can use this tool to create the device EUI:
<https://www.mobilefish.com/services/guid/guid.php>
- In the Device Overview screen, select Settings (Top right corner)
Change Activation Method to ABP.
- The Device Address (hex value), Network Session Key (msb, 16 bytes array) and App Session Key (msb, 16 bytes array) needs to be copied to our new Arduino sketch which I will explain in a moment.

DEMONSTRATION

- In the Arduino IDE, select menu File | Examples | MCC LoRaWAN LMIC library and select the ttn-abp sketch. Re-save the ttn-abp sketch and call it ttn-abp-mydemo.
- In this sketch you must enter:
 - The Network Session Key (NwkSKey). Enter as a 16 bytes array in big-endian format.
 - The Application Session Key (AppSKey). Enter as a 16 bytes array in big-endian format.
 - The Device Address (DevAdr). Enter as a 4 bytes hex value. Do not forget to add the prefix 0x.
- Same as in Tutorial 22, the message "Hello, world!" is transmitted every 60 seconds.
- If we use this transmit time interval we will NOT comply with the TTN Fair Access Policy if we run this sketch for more than 24 hours and the data rate is SF7BW125 or even worse SF12BW125. Please do the calculations your self.

DEMONSTRATION

- Make the same pin mapping changes as explained in Tutorial 22.

```
// Pin mapping
const lmic_pinmap lmic_pins = {
  .nss = 10,
  .rxtx = LMIC_UNUSED_PIN,
  .rst = 5,
  .dio = {2, 3, LMIC_UNUSED_PIN},
};
```

HopeRF RFM95 LoRa transceiver module	Arduino Uno Pin		HopeRF RFM95 LoRa transceiver module	Arduino Uno Pin
ANT	-		GND	-
GND	GND		DIO5	-
DIO3	-		RESET	5
DIO4	-		NSS	10
3.3V	3.3V		SCK	13
DIO0	2		MOSI	11
DIO1	3		MISO	12
DIO2	-		GND	-

- Modify the loop function:

```
void loop() {
  os_runloop_once();
}
```

DEMONSTRATION

- Connect the self build LoRa development board to your computer using the USB cable.
- In the Arduino IDE, select menu Tools | Board and select: *Arduino/Genuino Uno*
In the Arduino IDE, select menu Tools | Port and select: *your_port*
- Compile *ttn-abp-mydemo* sketch.
You should not see any errors.
- Upload the *ttn-abp-mydemo* sketch to the Arduino Uno.
You should not see any errors.
- In the Arduino IDE, select menu Tools | Serial Monitor
Select baud rate: *115200*

DEMONSTRATION

- Goto The Things Network console:
 - Select the app: youtube_demo_app
 - Select the registered device: youtube_demo_device2
 - Select reset frame counters. Do this each time your end device is powered up.
- In the Device Overview screen, top right corner, select Data.
- The message “Hello, world!” (in hex: 48 65 6c 6c 6f 2c 20 77 6f 72 6c 64 21) is received by a gateway and send to the network server and displayed in the The Things Network console. Please note: There is no Join-Request message send.