Practicum A

1 – End device stuurt alleen paketten door, regelt geen routing.

2 –

JV - Used during join and rejoin attempts to determine if a coordinator is present on the target network.

CE - Determines whether the device should form or join a network.

DH - Set or read the upper 32 bits of the 64-bit destination address.

DL - Set or display the lower 32 bits of the 64-bit destination address.

SM - Sets or displays the sleep mode of the device.

SP - Sets the duration of sleep time for the end device, up to 28 seconds. Use the SN command to extend the sleep time past 28 seconds.

SO - A bitfield that contains advanced sleep options that do not have dedicated AT commands.

OP - Read the 64-bit extended PAN ID of the attached network. The OP value reflects the operating 64-bit extended PAN ID where the device is running.

CH - Read the channel number of the attached network. Channels are represented as IEEE 802.15.4 channel numbers.

3 - Application Transparent ("transparent mode") and Application Programming Interface ("API mode")

4 –

Transparent mode - This mode is called "transparent" because the radio passes information along exactly as it receives it. All serial data received by the radio module is sent wirelessly to a remote destination XBee module. When the other module receives the data, it is sent out through the serial port exactly as it was received. Transparent mode has limited functionality but is an easy way to get started with XBee devices.

API mode - Application Programming Interface (API) operating mode is an alternative to transparent mode. In API mode, a protocol determines the way information is exchanged. Data is communicated in packets (commonly called API frames). This mode allows you to form larger networks and is more appropriate for creating sensor networks to perform tasks such as collecting data from multiple locations, controlling devices remotely, or automating your home.

5 –

By default, XBee devices are configured to work in transparent mode: all data received through the serial input is queued up for radio transmission and data received wirelessly is sent to the serial output exactly as it is received, with no additional information.

6 –

The API Enable (AP) parameter configures the XBee module to operate using a frame-based API instead of the default Transparent mode. It allows you to select between the two supported API modes and the default transparent operation.

7 - Unknwon address if the destination's 16-bit address is unknown, or if sending a broadcast

8 –

Command mode is a state in which incoming characters are interpreted as commands. To get a device to switch into this mode, you must issue a unique string of text in a special way: +++. When the device sees a full second of silence in the data stream followed by the string +++ (without Enter or Return) and another full second of silence, it knows to stop sending data through and start accepting commands locally.

9 – ID and SP

10 –

Devices that join the network must obtain the network key when they join. When a device joins a secure network, the network and link keys can be sent to the joining device. If the joining device has a preconfigured trust center link key, the network key will be sent to the joining device encrypted by the link key. Otherwise, if the joining device is not preconfigured with the link key, the device could only join the network if the network key is sent unencrypted ("in the clear").

11 -

A – Ja

B – BABACECE

C – 26B8

12 -

A – Ja

B – BABACECE

C – 26B8

Practicum B

1 – Blauw, geel, groen, rood tijdens versturen/ontvangen

2 - niks

3 – Device negeert de inkomende/uitgaande berichten tijdens hibernate mode.

4 – ST

5 – SP op coordinator moet hetzelfde zijn

6 – 4 en 15

7 – 15, er is net wat minder ruis vergeleken met 4.

8 – B, ATCH

9 – 14dBm, 25.118864315 mw

ATPP

|  |  |  |
| --- | --- | --- |
| Setting | ,dBm | mW |
| 4 | 14 | 25.118864315 |
| 3 | 10 | 10 |
| 2 | 3 | 1.995262315 |
| 1 | 0 | 1 |
| 0 | -5 | 0.31622776602 |

10 – 1200m (non-pro), 3200m (pro)

11 – ATPL0

12 – 7FFF

13 – 8F0F

14 – B (11)

15 –

A - local -25 dBm, remote -15 dBm

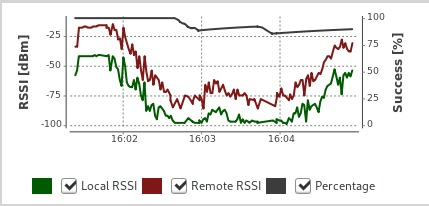
B - local -20 dBm, remote -20 dBm

C - Vericale positie van de atennes is effectiever door de fresnel zone

D - Verticaal

16 - -100dBm local, -80 dBm remote

17



18 – Het zendvermogen moet beperkt worden om ervoor te zorgen dat de batterij langer mee gaat.

Practicum C

1 -

IO Data Sample RX Indicator (API 1)

7E 00 12 92 00 13 A2 00 41 92 99 4C 87 8D 01 01 00 00 02 01 1F C8

Start delimiter: 7E

Length: 00 12 (18)

Frame type: 92 (IO Data Sample RX Indicator)

64-bit source address: 00 13 A2 00 41 92 99 4C

16-bit source address: 87 8D

Receive options: 01

Number of samples: 01

Digital channel mask: 00 00

Analog channel mask: 02

DIO1/AD1 analog value: 01 1F (287)

Checksum: C8

2 -

Volgende waarden zijn veranderd

DIO1/AD1 analog value: 02 99 (665)

Checksum: 4D

3 – AT – D2, Parameter – 05 HEX

4 -

Remote AT Command Request (API 1)

7E 00 10 17 01 00 13 A2 00 41 92 99 4C FF FE 02 44 32 04 01

Start delimiter: 7E

Length: 00 10 (16)

Frame type: 17 (Remote AT Command Request)

Frame ID: 01 (1)

64-bit dest. address: 00 13 A2 00 41 92 99 4C

16-bit dest. address: FF FE

Command options: 02

AT Command: 44 32 (D2)

Parameter: 04

Checksum: 01

5 -

SM – Cyclic sleep [4]

SP – 7D0

IO – C8

6 – Router reageert alleen eens in de twintig seconden. Led reageert wanneer device niet in de sleep mode is.

7 – SP op coordiantor moet hetzelfde zijn als op de router.

Practicum Lora A

1 – OTAA heeft een join procedure waarin het devaddr en geheime sleutels worden opgezet. In ABP worden deze hardcoded, waardoor het minder veilig wordt.

2 – sys factoryRESET

RN2483 1.0.5 Oct 31 2018 15:06:52

3 – sys mac radio

4 – sys get vdd

3294

5 – 70 B3 D5 7E D0 01 97 1E

6 – sys get hweui

00 04 A3 0B 00 20 D3 42

7 – 95 AA D1 D4 F3 6D EB 85 CA 1E 6F 35 6D F2 A1 E3

8 – om de twee sessie sleutels af te leiden tijdens de activatie

9 – never seen

10 – mac set appkey

ok

11 – mac set appeui

ok

12 – mac save

ok

13 – otaa

ok

accepted

14 -

status veranderd

device address, network session key en app session zijn erbij gekomen

15 – voor communicatie binnen het netwerk

16 – validiteit van de berichten bevestigen

17 - wordt gebruikt voor encryptie tussen de node en applicatie server

18 – application eui wordt gebruikt om aan te geven naar welk netwerk data verzonden moet worden.

App key wordt gebruikt om de berichten te versleutelen tussen de node en bestemming.

19 -

a – 867.1

b – 12

c – 125

d – 4/5

20 – 827.392 ms

24 –

mac set ch freq

radio set sf

radio set bw

radio set pwr

Lora B

1 – Node heeft geen uplink verstuurd

2 – mac tx uncnf 1 A

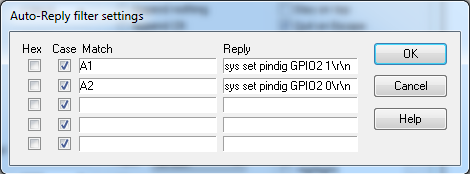
ok

mac\_rx 1 BABAFEFE

3 – sys set pinmode GPIO2 digout

sys set pindig GPIO2 1

4 -



5 – periode waarin het device actief is

6 – maximaal 1%

g(863.0 – 868.0MHz): 1%

g1(868.0 – 868.6 MHz): 1%

g2(868.7 – 869.2 MHz): 0.1%

g4(869.7 – 870.0 MHz): 1%

7 – Maximaal 30 seconden uptime per dag per node

Maximaal 10 downlink berichten per dag per node

8 – stel gemiddeld tijd bericht versturen is 100ms

max uptime / tijd bericht versturen

30.000 / 100 = 3000 berichten per dag

9 – Kleine spreading factor gebruiken

10 – Ik beschik niet over een laptop met Windows. Hierom zal ik het verwachtte antwoord hieronder geven.

De rssi (received signal strenght indicator) zal omlaag gaan, de sterkte van het signaal gaat immers omlaag door de grotere afstand.

De snr (signal to noise ratio) zal omhoog gaan. Er zijn meer obstakels tussen de bestemming en de node.