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SLEEP Mode for MR400

version 10.0.98.0
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1. Introduction

The MR400 series of radio modems are powered by a 13.8 V DC voltage source. Idle current consumption is 350 to 500 mA depending on the modules mounted. The modem can be put into SLEEP mode when current consumption drops to 2.5 mA. The SLEEP mode is indicated by the POWER ON LED flashing with a period of 2.5 sec.

Going into SLEEP mode:

- by a packet from the Supervisor application
- by ADIO agent at the end of the set time
- using `mo` command or by the service packet

The active state can be restored in three ways:

- at the end of the time set in the `Ue` menu
- by connecting a data signal to port SCC2 or SCC3
- by interrupting the supply for at least 15 sec

2. Data Format

A service packet for transition to SLEEP mode:

```
|serNo/16|res/8|cmd/8|time/32|chksum/16|
```

```
serNo - 0xE02A  service number
res   - 0x00    reserve
cmd   - 0x01    transition to sleep state, waking up by time or by packet on SCC2, SCC3
       - 0x02    transition to sleep state, waking up by time
       - 0x03    turn off and after a few seconds turn on (power cycle)
time  - 0x00000000  time of the sleep state, until fw 10.0.97.0 zero value
chs   - 0x1FD5    checksum
```

Example: E02A 0001 0000 0000 1FD5

Since fw 10.0.98.0 and modem board 7.1 there are active the commands cmd 0x02, 0x03. The sleep time can be written on position `time` in cmd 0x01, 0x02.

An example command to sleep for 10 seconds:

```
E02A 0001 0000 000A 1FCB
```

Example of calculating the checksum:

```
0x0 - 0xE02A - 0x0001 - 0x0000 - 0x000A = 0x1FCB
```

Reply format:

```
|serNo/16|res/8|cmd/8|time/32|
```

```
serNo - 0xE02A  service number
res   - 0x00    reserve
cmd   - 0x01    command
time  - 0x..    time kept in sleep mode (seconds)
```

Example for time 20dec = 0x14 **sec**: E02A 0001 0000 0014

Time remaining in the sleep mode is taken from the menu `Unit edit` or from `alar(m) time` in the destination modem or from item `time` in service packet, which takes precedence.

Parameter `m(o)de` in the `Unit edit` must have a value of 1.

3. Implementation in MORSE

Transition to **sleep mode**:

1. the CU can be switched into SLEEP mode at any time from the control application Supervisor, which can be a part of the Ranec sw
2. by configuration of ADIO agent, the presence of the ADIO module is not necessary. The mode `power control (solar)` is chosen, the active time for CU is selected, see the example Section 4.2, "Active time". The activity time `GPe Opdls` is recommended to be set to at least 30 sec. For a shorter time it is difficult to change the configuration later. It is also recommended to set the `alar(m) time` in the menu `Unit edit` in advance.
3. by service packet E02A 0001 0000 0000 1FD5, packet type 0x10. The condition is to set the quiet time using the parameter `alar(m) time` in the menu `Unit edit`.
4. or from menu `(m)isc p(o)wer save`. The condition is the `alar(m) time` again.

After the arrival of the command a reply is sent and then after a time delay of 500 ms the radio modem switches to sleep mode.

The **active state** can be restored in three ways:

1. at the end of the `alar(m) time` in the `Unit edit` menu

- by sending an arbitrary data packet to SCC2 or SCC3; this option applies from HW version 4.2, i.e. from version "mmu30" of module SCC2+3. The "wake up" data can be 1 or more bytes of data sent from external equipment with a speed of 115.2 kbit/s or lower.

The transition of the modem to its active state requires a certain amount of time:

- SCC2 and SCC3 activate for approx. 500 ms, and only then is a packet received and ACK sent; it is necessary to count on this during configuration of the packet source, for example, by secure transmission with repeating
- The radio channel activates for approx. 7 sec, after which the message is transferred to the radio network

- by interrupting the power supply for more than 15 sec

4. Configuration Parameters

The configuration example - switching the quiet periods according to menu `Unit edit` and active periods according to ADIO agent:

4.1. Quiet time

In the menu `(U)nit (e)dit` select the sleep mode duration and the mode. This setting is also necessary for the switching into sleep state by the ADIO agent. Commands used:

```
Ue
m20 ... CU stays in the power-saving mode (SLEEP) for 20 sec
o1 ... the whole CU including the radio part is switched into sleep state
```

```
Power saving:
alar(m) time:20s m(o)de:0001
```

```
alarm time: the time between 10 to 86400 sec
mode:      0001 - radio and modem part go into sleep mode
           0000 - only radio part goes into sleep mode
```

4.2. Active time

Choose the activity time using the ADIO agent. Then the CU switches into sleep state. Valid from version sw 758 and from HW 4.1. The ADIO agent description is located among protocols¹. Used commands:

```
GPe 0td
  Opd o20 ... 200 ms pooling
      01 ... mode power control (solar)
      1s30 ... 30 sec activity time, asleep after 30 sec
```

After setting this up the CU switches periodically for 20 sec into sleep mode. This is indicated by the POWER ON LED flashing. It then switches for 30 sec into standard working mode.

¹ <https://www.racom.eu/eng/support/prot/adio/index.html>

5. History

Described for version SW 8.02.

Module ADIO is not required for the sleep function from version sw758.

The SLEEP function for series MW and MX works from HW version 4.0. This version also contains the proper module SCC2+3.

This HW version 4.2. contains module SCC2+3 in version mmu30 (Cannon) or mus20 (screws terminals) which is necessary for the wake up function via the data signal.

The SLEEP function for series MR, MD, MC and MG requires the modem HW version 4.2 and next, see the menu (H)W (e)dit:

```
HW data:
product (t)ype:MR400 su(b)type note:
HW (v)ersion:4 s(u)bver:2
```

10.0.89.0 - Since this version is the extent of sleep time from 10 to 86 399 sec for:

- MR, MD, MG, MC hw version 7.1 and later
- MW, MX hw version 4.1

10.0.98.0 - able to fall asleep for the time contained in the packet