

目次

SA-200 シリーズ

Features (予定)

shell

MA-E320 + SA-200 (MA-E360) 対向

radvd でアドレスを振ってみる

Files

Firmware

1

1

1

2

4

5

5

SA-200 シリーズ

920MHz 無線 + 電池駆動 + 各種センサー ???

Features (予定)

- IEEE802.15.4g
- 6LowPAN support
- RealTime OS¹⁾

shell

```
> ps
      pid | name                | state  Q | pri | stack ( used) |
location
      1 | idle                | pending Q | 15 | 2048 ( 160) |
0x200011bc
      2 | main                | running Q | 7  | 3072 ( 1164) |
0x200005bc
      3 | uart0               | bl rx  _ | 6  | 4096 ( 268) |
0x20001c80
      4 | l2_pkt_handler      | bl rx  _ | 5  | 2048 ( 236) |
0x20002c80
      5 | Transceiver         | bl rx  _ | 4  | 2048 ( 244) |
0x20007470
      6 | radio               | bl rx  _ | 5  | 3072 ( 292) |
0x20006130
      7 | ip_process          | bl rx  _ | 6  | 3072 ( 304) |
0x200040d4
      8 | lowpan_context_rem  | bl mutex _ | 8  | 2048 ( 348) |
0x20004cd4
      9 | lowpan_transfer     | sleeping _ | 6  | 2048 ( 192) |
0x200054d4
      | SUM                |         |    | 23552 ( 3208)
> ifconfig
Iface  0  HWaddr: 0x461c Channel: 33 PAN ID: 0xabcd
        EUI-64: 76-b0-e7-85-7e-ad-ab-84
        Source address mode: short
        Transceivers:
          * ml7396

> help
Command                Description
-----
reboot                  Reboot the node
ps                      Prints information about running threads.
```

```

addr          Gets or sets the address for the transceiver
eui64         Gets or sets the EUI-64 for the transceiver
chan          Gets or sets the channel for the transceiver
txtsnd        Sends a text message to a given node via the
transceiver
pan           Gets or sets the pan id for the transceiver
monitor       Enables or disables address checking for the
transceiver
l2_ping       Sends link layer ping requests
l2_probe      Sends link layer probes
l2_probe_stats Get statistics about received probes
ifconfig      Configures a network interface
mersenne_init initializes the PRNG
mersenne_get  returns 32 bit of pseudo randomness
> ifconfig 0 set
Usage: ifconfig <if_id> set <key> <value>
      Sets an transceiver specific value
      <key> may be one of the following
        * "srcaddrmode" - sets the source address mode for IEEE
                        802.15.4 transeivers (valid values: "short" or
"long"),
        * "sam" - alias for "srcaddrmode"
        * "eui64" - sets the EUI-64 if supported by transceivers,
        * "hwaddr" - sets the 16-bit address (or just the address
                        for e.g cc1100) of the transceivers
        * "pan_id" - sets the PAN ID of the transceiver
        * "pan" - alias for "pan_id"
        * "channel" - sets the frequency channel of the transceiver
        * "chan" - alias for "channel"
> ifconfig 0 set srcaddrmode long
> ifconfig 0
Iface  0   HWaddr: 0x461c Channel: 33 PAN ID: 0xabcd
        EUI-64: 76-b0-e7-85-7e-ad-ab-84
        Source address mode: long
        Transceivers:
          * ml7396
>

```

MA-E320 + SA-200 (MA-E360) 対向

```

root@plum:/home/user1# ping6 fe80::68ef:8759:2798:df2e%lowpan0 -c 10
PING fe80::68ef:8759:2798:df2e%lowpan0(fe80::68ef:8759:2798:df2e) 56 data
bytes
64 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=1 ttl=64 time=107 ms
64 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=2 ttl=64 time=107 ms
64 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=3 ttl=64 time=134 ms

```

```
64 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=4 ttl=64 time=107 ms
64 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=5 ttl=64 time=113 ms
64 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=6 ttl=64 time=144 ms
64 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=7 ttl=64 time=107 ms
64 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=8 ttl=64 time=109 ms
64 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=9 ttl=64 time=107 ms
64 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=10 ttl=64 time=110 ms

--- fe80::68ef:8759:2798:df2e%lowpan0 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9012ms
rtt min/avg/max/mdev = 107.628/115.090/144.069/12.436 ms
root@plum:/home/user1# ping6 fe80::68ef:8759:2798:df2e%lowpan0 -c 10 -s 200
PING fe80::68ef:8759:2798:df2e%lowpan0(fe80::68ef:8759:2798:df2e) 200 data
bytes
208 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=1 ttl=64 time=280 ms
208 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=2 ttl=64 time=279 ms
208 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=3 ttl=64 time=280 ms
208 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=4 ttl=64 time=280 ms
208 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=5 ttl=64 time=279 ms
208 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=6 ttl=64 time=277 ms
208 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=7 ttl=64 time=280 ms
208 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=8 ttl=64 time=280 ms
208 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=9 ttl=64 time=279 ms
208 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=10 ttl=64 time=346 ms

--- fe80::68ef:8759:2798:df2e%lowpan0 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9012ms
rtt min/avg/max/mdev = 277.506/286.408/346.144/19.941 ms

root@plum:/home/user1# ping6 fe80::68ef:8759:2798:df2e%lowpan0 -c 5 -s 1500
-i 3
PING fe80::68ef:8759:2798:df2e%lowpan0(fe80::68ef:8759:2798:df2e) 1500 data
bytes
1508 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=1 ttl=64 time=1661 ms
1508 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=2 ttl=64 time=1667 ms
1508 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=3 ttl=64 time=1741 ms
1508 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=4 ttl=64 time=1669 ms
1508 bytes from fe80::68ef:8759:2798:df2e: icmp_seq=5 ttl=64 time=1668 ms

--- fe80::68ef:8759:2798:df2e%lowpan0 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 12007ms
rtt min/avg/max/mdev = 1661.685/1681.572/1741.324/29.989 ms

root@plum:/home/user1# ifconfig lowpan0
lowpan0  Link encap:UNSPEC  HWaddr 96-A7-65-6C-BC-
F8-37-37-00-00-00-00-00-00-00-00-00-00-00-00-00
        inet6 addr: fe80::94a7:656c:bcf8:3737/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1280  Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
```

```
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
```

```
root@plum:/home/user1# ifconfig wpan0
wpan0      Link encap:UNSPEC HWaddr 96-A7-65-6C-BC-
F8-37-37-00-00-00-00-00-00-00
          UP BROADCAST RUNNING NOARP MTU:127 Metric:1
          RX packets:212 errors:0 dropped:0 overruns:0 frame:0
          TX packets:254 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:300
          RX bytes:13470 (13.4 KB) TX bytes:21181 (21.1 KB)
```

radvd でアドレスを振ってみる

```
lowpan0    Link encap:UNSPEC HWaddr 21-97-AE-3D-E2-18-92-
AF-00-00-00-00-00-00-00-00
          inet6 addr: 2001:dead:beef:0:41b8:46e:c4d5:c714/64 Scope:Global
          inet6 addr: fe80::2397:ae3d:e218:92af/64 Scope:Link
          inet6 addr: 2001:dead:beef:0:2397:ae3d:e218:92af/64 Scope:Global
          UP BROADCAST RUNNING MULTICAST MTU:1280 Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
```

```
wpan0      Link encap:UNSPEC HWaddr 21-97-AE-3D-E2-18-92-
AF-00-00-00-00-00-00-00-00
          UP BROADCAST RUNNING NOARP MTU:127 Metric:1
          RX packets:1 errors:0 dropped:0 overruns:0 frame:0
          TX packets:10 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:300
          RX bytes:52 (52.0 B) TX bytes:557 (557.0 B)
```

```
root@plum:/home/user1# ping6 2001:dead:beef:0:2397:ae3d:e218:92af -s 600 -c
10
PING
2001:dead:beef:0:2397:ae3d:e218:92af(2001:dead:beef:0:2397:ae3d:e218:92af)
600 data bytes
608 bytes from 2001:dead:beef:0:2397:ae3d:e218:92af: icmp_seq=1 ttl=64
time=349 ms
608 bytes from 2001:dead:beef:0:2397:ae3d:e218:92af: icmp_seq=2 ttl=64
time=348 ms
608 bytes from 2001:dead:beef:0:2397:ae3d:e218:92af: icmp_seq=3 ttl=64
time=349 ms
608 bytes from 2001:dead:beef:0:2397:ae3d:e218:92af: icmp_seq=4 ttl=64
time=348 ms
608 bytes from 2001:dead:beef:0:2397:ae3d:e218:92af: icmp_seq=5 ttl=64
time=348 ms
608 bytes from 2001:dead:beef:0:2397:ae3d:e218:92af: icmp_seq=6 ttl=64
```

```
time=348 ms
608 bytes from 2001:dead:beef:0:2397:ae3d:e218:92af: icmp_seq=7 ttl=64
time=347 ms
608 bytes from 2001:dead:beef:0:2397:ae3d:e218:92af: icmp_seq=8 ttl=64
time=348 ms
608 bytes from 2001:dead:beef:0:2397:ae3d:e218:92af: icmp_seq=9 ttl=64
time=348 ms
608 bytes from 2001:dead:beef:0:2397:ae3d:e218:92af: icmp_seq=10 ttl=64
time=347 ms

--- 2001:dead:beef:0:2397:ae3d:e218:92af ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9010ms
rtt min/avg/max/mdev = 347.886/348.624/349.920/0.933 ms
root@plum:/home/user1# ifconfig lowpan0
lowpan0    Link encap:UNSPEC  HWaddr A9-ED-
D9-5C-6F-75-1B-83-00-00-00-00-00-00-00-00-00-00
        inet6 addr: 2001:dead:beef::1/64 Scope:Global
        inet6 addr: fe80::abed:d95c:6f75:1b83/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1280  Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

root@plum:/home/user1#
```

Files

File	Stat	SHA1SUM	Info
ml7396_lowpan.pcap	2015/05/13 12:00 6.5 KB	-	ping over 6LowPAN packet capture

Firmware

File	Stat	SHA1SUM	Info
mae3xx_trusty_v3_0_0alpha3.img	2015/05/12 11:20 66.1 MB	5c60044166d866862f7a82a5bfac263a345087ae	Linux-4.0.0

1)
RIOT OS

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