

MikroTik RouterOS Memory Corruption

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MikroTik's RouterOS suffers from multiple memory corruption vulnerabilities. Various versions are affected.

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Advisory: four vulnerabilities found in MikroTik's RouterOS

Details

Product: MikroTik's RouterOS
Vendor URL: <https://mikrotik.com/>
Vendor Status: only CVE-2020-20227 is fixed
CVE: CVE-2020-20220, CVE-2020-20227, CVE-2020-20245, CVE-2020-20246
Credit: Qian Chen(ecq674350529) of Qihoo 360 Nirvan Team

Product Description

RouterOS is the operating system used on the MikroTik's devices, such as switch, router and access point.

Description of vulnerabilities

These vulnerabilities were reported to the vendor almost one year ago. And the vendor confirmed these vulnerabilities.

1. CVE-2020-20220

The bfd process suffers from a memory corruption vulnerability. By sending a crafted packet, an authenticated remote user can crash the bfd process due to invalid memory access.

Against stable 6.46.5, the poc resulted in the following crash dump.

```
# cat /rw/logs/backtrace.log
2020.06.19-18:36:13.8880:
2020.06.19-18:36:13.8880:
2020.06.19-18:36:13.8880: /ram/pkg/routing/nova/bin/bfd
2020.06.19-18:36:13.8880: --- signal=11
-----
2020.06.19-18:36:13.8880:
2020.06.19-18:36:13.8880: eip=0x0804b175 eflags=0x00010202
2020.06.19-18:36:13.8880: edi=0x08054a90 esi=0x08054298 ebx=0x7f9d3e88
esp=0x7f9d3e70
2020.06.19-18:36:13.8880: eax=0x08050634 ebx=0x77777af0 ecx=0x08051274
edx=0x00000001
2020.06.19-18:36:13.8880: maps:
2020.06.19-18:36:13.8880: 08048000-08050000 r-xp 00000000 00:1b 16
/ram/pkg/routing/nova/bin/bfd
2020.06.19-18:36:13.8880: 7759a000-7759c000 r-xp 00000000 00:0c 959
/lib/libd1-0.9.33.2.so
2020.06.19-18:36:13.8880: 7759e000-775d3000 r-xp 00000000 00:0c 964
/lib/libuClibc-0.9.33.2.so
2020.06.19-18:36:13.8880: 775d7000-775f1000 r-xp 00000000 00:0c 960
/lib/libgcc_s.so.1
2020.06.19-18:36:13.8880: 775f2000-77601000 r-xp 00000000 00:0c 944
/lib/libc++.so
2020.06.19-18:36:13.8880: 77602000-7775f000 r-xp 00000000 00:0c 954
/lib/libcrypto.so.1.0.0
2020.06.19-18:36:13.8880: 7776f000-77777000 r-xp 00000000 00:0c 950
/lib/libubox.so
2020.06.19-18:36:13.8880: 77778000-777c4000 r-xp 00000000 00:0c 946
/lib/libumsg.so
2020.06.19-18:36:13.8880: 777ca000-777d1000 r-xp 00000000 00:0c 958
/lib/libuClibc-0.9.33.2.so
2020.06.19-18:36:13.8880:
2020.06.19-18:36:13.8880: stack: 0x7f9d4000 - 0x7f9d3e70
2020.06.19-18:36:13.8880: 34 06 05 08 40 e6 04 08 d8 3e 9d 7f 90 4a 05
08 98 42 05 08 d8 3e 9d 7f f8 3e 9d 7f 6d 39 77 77
2020.06.19-18:36:13.8880: 90 4a 05 08 28 40 9d 7f 05 00 00 00 00 43 05
08 00 00 00 28 90 7c 77 01 00 00 00 0c 00 00 00
2020.06.19-18:36:13.8880:
2020.06.19-18:36:13.8880: code: 0x04b175
2020.06.19-18:36:13.8880: ff 05 00 00 00 00 83 c4 10 c9 c3 55 89 e5 53
83
```

This vulnerability was initially found in long-term 6.44.6, and it seems that the latest stable version 6.48.2 still suffer from this vulnerability.

2. CVE-2020-20227

The diskd process suffers from a memory corruption vulnerability. By sending a crafted packet, an authenticated remote user can crash the diskd process due to invalid memory access.

Against stable 6.47, the poc resulted in the following crash dump.

```
# cat /rw/logs/backtrace.log
2020.06.05-15:00:38.3380:
2020.06.05-15:00:38.3380:
2020.06.05-15:00:38.3380: /nova/bin/diskd
2020.06.05-15:00:38.3380: --- signal=11
-----
2020.06.05-15:00:38.3380:
2020.06.05-15:00:38.3380: eip=0x7775a1e3 eflags=0x00010202
2020.06.05-15:00:38.3380: edi=0x7f9d4024 esi=0x0000000a ebx=0x7f9dceb8
esp=0x7f9dceac
2020.06.05-15:00:38.3380: eax=0x0000000a ebx=0x777624ec ecx=0x08054600
edx=0x08056e18
2020.06.05-15:00:38.3380: maps:
2020.06.05-15:00:38.3380: 08048000-08052000 r-xp 00000000 00:0c 1049
/nova/bin/diskd
2020.06.05-15:00:38.3380: 776ef000-77734000 r-xp 00000000 00:0c 966
/lib/libuClibc-0.9.33.2.so
2020.06.05-15:00:38.3380: 77738000-77752000 r-xp 00000000 00:0c 962
/lib/libgcc_s.so.1
2020.06.05-15:00:38.3380: 77753000-77762000 r-xp 00000000 00:0c 945
/lib/libc++.so
2020.06.05-15:00:38.3380: 77763000-7776b000 r-xp 00000000 00:0c 951
/lib/libubox.so
2020.06.05-15:00:38.3380: 7776c000-777b8000 r-xp 00000000 00:0c 947
/lib/libumsg.so
2020.06.05-15:00:38.3380: 777be000-777b5000 r-xp 00000000 00:0c 960
/lib/libuClibc-0.9.33.2.so
2020.06.05-15:00:38.3380:
2020.06.05-15:00:38.3380: stack: 0x7f9de000 - 0x7f9dceac
2020.05-15:00:38.3380: f4 8a 7b 77 0a 00 00 00 f4 8a 7b 77 e8 ce 9d
7f 92 be 78 77 f8 45 05 08 0a 00 00 00 18 6a 05 08
2020.06.05-15:00:38.3380: 18 6e 05 08 e4 ce 9d 7f 24 d0 9d 7f 7c 18 76
77 24 d0 9d 7f 18 69 05 08 40 cf 9d 7f a8 cf 9d 7f
2020.06.05-15:00:38.3480:
2020.06.05-15:00:38.3480: code: 0x7775a1e3
2020.06.05-15:00:38.3480: 8b 00 8b 10 01 c2 83 c2 04 52 83 c0 04 50 ff
75
```

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OpenBSD (479)
RedHat (12,469)
Slackware (941)
Solaris (1,607)

This vulnerability was initially found in stable 6.47, and it was fixed at least in stable 6.48.1.

3. CVE-2020-20245

The log process suffers from a memory corruption vulnerability. By sending a crafted packet, an authenticated remote user can crash the log process due to invalid memory access.

Against stable 6.47, the poc resulted in the following crash dump.

```
# cat /rw/logs/backtrace.log
2020.06.22-20:13:36.2980:
2020.06.22-20:13:36.2980:
2020.06.22-20:13:36.6280: /nova/bin/log
2020.06.22-20:13:36.6280: --- signal=11
-----
2020.06.22-20:13:36.6280:
2020.06.22-20:13:36.6280: eip=0x77709d2e eflags=0x00010202
2020.06.22-20:13:36.6280: edi=0x0000004b esi=0x77718f00 ebp=0x7fec6858
esp=0x7fec6818
2020.06.22-20:13:36.6280: eax=0x00000031 ebx=0x77717000 ecx=0x777171e8
edx=0x00000006
2020.06.22-20:13:36.6280:
2020.06.22-20:13:36.6280: maps:
2020.06.22-20:13:36.6280: 08048000-08058000 r-xp 00000000 00:0c 1005
/nova/bin/log
2020.06.22-20:13:36.6280: 776e1000-77716000 r-xp 00000000 00:0c 966
/lib/libuClibc-0.9.33.2.so
2020.06.22-20:13:36.6280: 7771a000-77734000 r-xp 00000000 00:0c 962
/lib/libgcc_s.so.1
2020.06.22-20:13:36.6280: 77735000-77744000 r-xp 00000000 00:0c 945
/lib/libuc++_so
2020.06.22-20:13:36.6280: 77745000-77791000 r-xp 00000000 00:0c 947
/lib/libumsg.so
2020.06.22-20:13:36.6280: 77797000-7779e000 r-xp 00000000 00:0c 960
/lib/libuClibc-0.9.33.2.so
2020.06.22-20:13:36.6280:
2020.06.22-20:13:36.6280: stack: 0x7fec7000 - 0x7fec6818
00 00 00 00 00 00 00 00 68 ec 7f 21 ac 70 77
2020.06.22-20:13:36.6280: 40 00 00 00 1b fb 70 77 e8 71 71 77 c0 28 06
08 88 68 ec 7f ec 44 74 77 e4 29 06 08 40 69 ec 7f
2020.06.22-20:13:36.6280:
2020.06.22-20:13:36.6280: code: 0x77709d2e
2020.06.22-20:13:36.6280: 8b 48 08 89 4c 96 04 e9 93 05 00 00 81 7d e0
ff

This vulnerability was initially found in stable 6.46.3, and it seems that the latest stable version 6.48.2 still suffers from this vulnerability.

4. CVE-2020-20246



The mactel process suffers from a memory corruption vulnerability. By sending a crafted packet, an authenticated remote user can crash the mactel process due to NULL pointer dereference.



Against stable 6.47, the poc resulted in the following crash dump.



```
cat /rw/logs/backtrace.log
2020.06.22-20:25:36.1780:
2020.06.22-20:25:36.1780:
2020.06.22-20:25:36.1780: /nova/bin/mactel
2020.06.22-20:25:36.1780: --- signal=11

2020.06.22-20:25:36.1780:
2020.06.22-20:25:36.1780: eip=0x0804ddc7 eflags=0x00010202
2020.06.22-20:25:36.1780: edi=0x08055740 esi=0x7fe78144 ebp=0x7fe780c8
esp=0x7fe78090
2020.06.22-20:25:36.1780: eax=0x00000000 ebx=0x776b9b40 ecx=0x0000000b
edx=0xffffffff
2020.06.22-20:25:36.1780:
2020.06.22-20:25:36.1780: maps:
2020.06.22-20:25:36.1780: 08048000-08051000 r-xp 00000000 00:0c 1041
/nova/bin/mactel
2020.06.22-20:25:36.1780: 7762c000-77661000 r-xp 00000000 00:0c 966
/lib/libuClibc-0.9.33.2.so
2020.06.22-20:25:36.1780: 77665000-7767f000 r-xp 00000000 00:0c 962
/lib/libgcc_s.so.1
2020.06.22-20:25:36.1780: 77680000-7768f000 r-xp 00000000 00:0c 945
/lib/libuc++_so
2020.06.22-20:25:36.1780: 77690000-776ad000 r-xp 00000000 00:0c 948
/lib/libcrypto.so
2020.06.22-20:25:36.1780: 776ae000-776af000 r-xp 00000000 00:0c 967
/lib/libutil-0.9.33.2.so
2020.06.22-20:25:36.1780: 776b1000-776b9000 r-xp 00000000 00:0c 951
/lib/libubox.so
2020.06.22-20:25:36.1780: 776ba000-77706000 r-xp 00000000 00:0c 947
/lib/libumsg.so
2020.06.22-20:25:36.1780: 7770c000-77713000 r-xp 00000000 00:0c 960
/lib/libuClibc-0.9.33.2.so
2020.06.22-20:25:36.1780:
2020.06.22-20:25:36.1780: stack: 0x7fe79000 - 0x7fe78090
08 58 57 05 08 28 b0 70 77 01 00 00 00 00 00 00
2020.06.22-20:25:36.1780: 1c 85 e7 7f 04 1d 05 08 02 db 70 77 40 9b 6b
77 40 57 05 08 44 81 e7 7f e8 80 e7 7f 7c 4a 6b 77
2020.06.22-20:25:36.1780:
2020.06.22-20:25:36.1780: code: 0x804ddc7
2020.06.22-20:25:36.1780: 8b 50 2f 89 55 da 66 8b 40 33 66 89 45 de 83
c4

This vulnerability was initially found in stable 6.46.3, and it seems that the latest stable version 6.48.2 still suffers from this vulnerability.

Solution

=====

As to CVE-2020-20227, upgrade to the corresponding latest RouterOS tree version. For others, no upgrade firmware available yet

References

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[1] https://mikrotik.com/download/changelogs/stable-release-tree


```


```

Spoof (2,166)	SUSE (1,444)
SQL Injection (16,102)	Ubuntu (8,199)
TCP (2,379)	UNIX (9,159)
Trojan (686)	UnixWare (185)
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