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Subject: [PATCH 0/4] Fix multiple race condition vulnerabilities in dvb-core and device driver
Date: Tue, 15 Nov 2022 05:18:18 -0800 [thread overview]
Message-ID: <20221115131822.6640-1-imv4bel@gmail.com> (raw)

From: Hyunwoo Kim <imv4bel@gmail.com>

Dear,

This patch set is a security patch for various race condition vulnerabilities that occur
in 'dvb-core' and 'ttusb_dec', a dvb-based device driver.

1. media: dvb-core: Fix use-after-free due to race condition occurring in dvb_frontend
This is a security patch for a race condition that occurs in the dvb_frontend system of dvb-core.

The race condition that occurs here will occur with _any_ device driver using dvb_frontend.

The race conditions that occur in dvb_frontend are as follows
(Description is based on drivers/media/usb/as102/as102_drv.c using dvb_frontend):
```
                cpu0                                                    cpu1

       1. open()
          dvb_frontend_open()
          dvb_frontend_get()    // kref : 3


                                                              2. as102_usb_disconnect()
                                                                 as102_dvb_unregister()
                                                                 dvb_unregister_frontend()
                                                                     dvb_frontend_put()    // kref : 2
                                                                 dvb_frontend_detach()
                                                                     dvb_frontend_put()    // kref : 1
       3. close()
          __fput()
          dvb_frontend_release()
          dvb_frontend_put()    // kref : 0
          dvb_frontend_free()
          __dvb_frontend_free()
          dvb_free_device()
          kfree (dvbdev->fops);
          ...
          fops_put(file->f_op);    // UAF!!
```
UAF occurs in the following order: '.probe -> open() -> .disconnect -> close()'.

The root cause of this is that wake_up() for dvbdev->wait_queue is implemented in the
dvb_frontend_release() function, but wait_event() is not implemented in the dvb_frontend_stop() function.

The KASAN log caused by this is as follows:
```
[   60.754938] ==================================================================
[   60.754942] BUG: KASAN: use-after-free in __fput+0xa55/0xaf0
[   60.754945] Read of size 8 at addr ffff888134ddf000 by task as102_test/2139

[   60.754949] CPU: 3 PID: 2139 Comm: as102_test Not tainted 6.1.0-rc2+ #16
[   60.754951] Hardware name: Gigabyte Technology Co., Ltd. B460MDS3H/B460M DS3H, BIOS F3 05/27/2020
[   60.754953] Call Trace:
[   60.754954]  <TASK>
[   60.754956]  dump_stack_lvl+0x49/0x63
[   60.754958]  print_report+0x177/0x46e
[   60.754962]  ? kasan_complete_mode_report_info+0x7c/0x210
[   60.754965]  ? __fput+0xa55/0xaf0
[   60.754970]  kasan_report+0xb0/0x140
[   60.754976]  ? __fput+0xa55/0xaf0
[   60.754979]  __asan_report_load8_noabort+0x14/0x20
[   60.754982]  __fput+0xa55/0xaf0
[   60.754985]  ____fput+0xe/0x20
[   60.754987]  task_work_run+0x153/0x240
[   60.754991]  ? task_work_cancel+0x20/0x20
[   60.754994]  ? fput+0xab/0x140
[   60.754997]  exit_to_user_mode_prepare+0x18f/0x1a0
[   60.754999]  syscall_exit_to_user_mode+0x26/0x50
[   60.755003]  do_syscall_64+0x69/0x90
[   60.755005]  ? do_syscall_64+0x69/0x90
[   60.755008]  ? debug_smp_processor_id+0x17/0x20
[   60.755010]  ? fpregs_assert_state_consistent+0x52/0xc0
[   60.755013]  ? exit_to_user_mode_prepare+0x49/0x1a0
[   60.755015]  ? irqentry_exit_to_user_mode+0x9/0x20
[   60.755018]  ? irqentry_exit+0x3b/0x50
[   60.755021]  ? sysvec_apic_timer_interrupt+0x57/0xc0
[   60.755024]  entry_SYSCALL_64_after_hwframe+0x63/0xcd
[   60.755027] RIP: 0033:0x4537eb
[   60.755029] Code: 03 00 00 00 0f 05 48 3d 00 f0 ff ff 77 41 c3 48 83 ec 18 89 7c 24 0c e8 c3 a8 02 00 8b 7c 24 0c 41 89 c0 b8 03 00 00 00 0f 05 <48> 3d 00 f0 ff ff 77 35 44 89 c7 89 44
24 0c e8 11 a9 02 00 8b 44
[   60.755031] RSP: 002b:00007ff8c1c001a0 EFLAGS: 00000293 ORIG_RAX: 0000000000000003
[   60.755034] RAX: 0000000000000000 RBX: 00007ff8c1c00640 RCX: 00000000004537eb
[   60.755036] RDX: 0000000000000000 RSI: 00007ff8bc000b70 RDI: 0000000000000003
[   60.755038] RBP: 00007ff8c1c001d0 R08: 0000000000000000 R09: 0000000000000000
[   60.755040] R10: 000000000000000a R11: 0000000000000293 R12: 00007ff8c1c00640
[   60.755042] R13: 0000000000000000 R14: 000000000041b290 R15: 00007ff8c1400000
[   60.755044]  </TASK>

[   60.755047] Allocated by task 2114:
[   60.755049]  kasan_save_stack+0x26/0x50
[   60.755052]  kasan_set_track+0x25/0x40
[   60.755054]  kasan_save_alloc_info+0x1e/0x30
[   60.755056]  __kasan_kmalloc+0xb4/0xc0
[   60.755058]  __kmalloc_node_track_caller+0x66/0x160
[   60.755061]  kmemdup+0x23/0x50
[   60.755063]  dvb_register_device+0x1cd/0x15c0 [dvb_core]
[   60.755070]  dvb_register_frontend+0x3cb/0x630 [dvb_core]
[   60.755078]  as102_dvb_register+0x335/0x4d0 [dvb_as102]
[   60.755083]  as102_usb_probe.cold+0x680/0x6eb [dvb_as102]
[   60.755087]  usb_probe_interface+0x266/0x740
[   60.755089]  really_probe+0x1fa/0xa80
[   60.755092]  __driver_probe_device+0x2cb/0x490
[   60.755094]  driver_probe_device+0x4e/0x140
[   60.755096]  __driver_attach+0x1a3/0x520
[   60.755098]  bus_for_each_dev+0x11e/0x1c0
[   60.755100]  driver_attach+0x3d/0x60
[   60.755102]  bus_add_driver+0x449/0x5a0
[   60.755103]  driver_register+0x219/0x390
[   60.755105]  usb_register_driver+0x228/0x400
[   60.755107]  0xffffffffc04c8023
[   60.755110]  do_one_initcall+0x97/0x310
[   60.755113]  do_init_module+0x19a/0x630
[   60.755115]  load_module+0x6ca4/0x7d90
[   60.755117]  __do_sys_finit_module+0x134/0x1d0
[   60.755119]  __x64_sys_finit_module+0x72/0xb0
[   60.755121]  do_syscall_64+0x59/0x90
[   60.755123]  entry_SYSCALL_64_after_hwframe+0x63/0xcd

[   60.755126] Freed by task 2139:
[   60.755128]  kasan_save_stack+0x26/0x50
[   60.755130]  kasan_set_track+0x25/0x40
[   60.755132]  kasan_save_free_info+0x2e/0x50
[   60.755134]  ____kasan_slab_free+0x174/0x1e0
[   60.755136]  __kasan_slab_free+0x12/0x20
[   60.755138]  slab_free_freelist_hook+0xd0/0x1a0
[   60.755140]  __kmem_cache_free+0x193/0x2c0
[   60.755143]  kfree+0x79/0x120
```

```
[   60.755145]  dvb_free_device+0x38/0x60 [dvb_core]
[   60.755151]  dvb_frontend_put.cold+0xa6/0x15a [dvb_core]
[   60.755160]  dvb_frontend_release.cold+0xc7/0xf6 [dvb_core]
[   60.755167]  __fput+0x2ce/0xaf0
[   60.755169]  ____fput+0xe/0x20
[   60.755171]  task_work_run+0x153/0x240
[   60.755173]  exit_to_user_mode_prepare+0x18f/0x1a0
[   60.755175]  syscall_exit_to_user_mode+0x26/0x50
[   60.755177]  do_syscall_64+0x69/0x90
[   60.755179]  entry_SYSCALL_64_after_hwframe+0x63/0xcd
```

Also, UAF can occur for driver-specfic structures (such as 'struct XXX_dev'):
```
                cpu0                                                    cpu1
       1. open()
          dvb_frontend_open()
                                                              2. as102_usb_disconnect()
                                                                 kref_put(&as102_dev->kref, as102_usb_release);    // kref : 0
                                                                 as102_usb_release()
                                                                 kfree(as102_dev);
       3. close()
          dvb_frontend_release()
          mutex_lock(&fe->dvb->mdev_lock);    // UAF
```

The KASAN log caused by this is as follows:
```
[   82.144178] ==================================================================
[   82.144182] BUG: KASAN: use-after-free in mutex_lock+0x81/0xe0
[   82.144189] Write of size 8 at addr ffff888121b6a168 by task as102_test/2356

[   82.144193] CPU: 12 PID: 2356 Comm: as102_test Not tainted 6.1.0-rc2+ #16
[   82.144196] Hardware name: Gigabyte Technology Co., Ltd. B460MDS3H/B460M DS3H, BIOS F3 05/27/2020
[   82.144198] Call Trace:
[   82.144200]  <TASK>
[   82.144201]  dump_stack_lvl+0x49/0x63
[   82.144205]  print_report+0x177/0x46e
[   82.144208]  ? kasan_complete_mode_report_info+0x7c/0x210
[   82.144212]  ? mutex_lock+0x81/0xe0
[   82.144215]  kasan_report+0xb0/0x140
[   82.144218]  ? mutex_lock+0x81/0xe0
[   82.144222]  kasan_check_range+0x3a/0x1d0
[   82.144224]  __kasan_check_write+0x14/0x20
[   82.144226]  mutex_lock+0x81/0xe0
[   82.144229]  ? __mutex_lock_slowpath+0x20/0x20
[   82.144234]  dvb_frontend_release.cold+0x178/0x4d2 [dvb_core]
[   82.144246]  __fput+0x2ce/0xaf0
[   82.144250]  ____fput+0xe/0x20
[   82.144253]  task_work_run+0x153/0x240
[   82.144257]  ? task_work_cancel+0x20/0x20
[   82.144260]  ? fput+0xab/0x140
[   82.144263]  exit_to_user_mode_prepare+0x18f/0x1a0
[   82.144266]  syscall_exit_to_user_mode+0x26/0x50
[   82.144270]  do_syscall_64+0x69/0x90
[   82.144273]  ? debug_smp_processor_id+0x17/0x20
[   82.144275]  ? fpregs_assert_state_consistent+0x52/0xc0
[   82.144279]  ? exit_to_user_mode_prepare+0x49/0x1a0
[   82.144281]  ? irqentry_exit_to_user_mode+0x9/0x20
[   82.144284]  ? irqentry_exit+0x3b/0x50
[   82.144287]  ? sysvec_apic_timer_interrupt+0x57/0xc0
[   82.144290]  entry_SYSCALL_64_after_hwframe+0x63/0xcd
[   82.144293] RIP: 0033:0x4537eb
[   82.144296] Code: 03 00 00 00 0f 05 48 3d 00 f0 ff ff 77 41 c3 48 83 ec 18 89 7c 24 0c e8 c3 a8 02 00 8b 7c 24 0c 41 89 c0 b8 03 00 00 00 0f 05 <48> 3d 00 f0 ff ff 77 35 44 89 c7 89 44
24 0c e8 11 a9 02 00 8b 44
[   82.144298] RSP: 002b:00007fc7600001a0 EFLAGS: 00000293 ORIG_RAX: 0000000000000003
[   82.144302] RAX: 0000000000000000 RBX: 00007fc760000640 RCX: 00000000004537eb
[   82.144304] RDX: 0000000000000000 RSI: 00007fc758000b70 RDI: 0000000000000003
[   82.144306] RBP: 00007fc7600001d0 R08: 0000000000000000 R09: 0000000000000000
[   82.144308] R10: 000000000000000a R11: 0000000000000293 R12: 00007fc760000640
[   82.144310] R13: 0000000000000000 R14: 000000000041b290 R15: 00007fc75f800000
[   82.144313]  </TASK>

[   82.144315] Allocated by task 2225:
[   82.144317]  kasan_save_stack+0x26/0x50
[   82.144320]  kasan_set_track+0x25/0x40
[   82.144322]  kasan_save_alloc_info+0x1e/0x30
[   82.144325]  __kasan_kmalloc+0xb4/0xc0
[   82.144327]  kmalloc_trace+0x4a/0xb0
[   82.144329]  as102_usb_probe.cold+0x58/0x6eb [dvb_as102]
[   82.144335]  usb_probe_interface+0x266/0x740
[   82.144338]  really_probe+0x1fa/0xa80
[   82.144341]  __driver_probe_device+0x2cb/0x490
[   82.144343]  driver_probe_device+0x4e/0x140
[   82.144345]  __driver_attach+0x1a3/0x520
[   82.144347]  bus_for_each_dev+0x11e/0x1c0
[   82.144348]  driver_attach+0x3d/0x60
[   82.144350]  bus_add_driver+0x449/0x5a0
[   82.144352]  driver_register+0x219/0x390
[   82.144354]  usb_register_driver+0x228/0x400
[   82.144356]  0xffffffffc0655023
[   82.144358]  do_one_initcall+0x97/0x310
[   82.144361]  do_init_module+0x19a/0x630
[   82.144363]  load_module+0x6ca4/0x7d90
[   82.144365]  __do_sys_finit_module+0x134/0x1d0
[   82.144367]  __x64_sys_finit_module+0x72/0xb0
[   82.144369]  do_syscall_64+0x59/0x90
[   82.144371]  entry_SYSCALL_64_after_hwframe+0x63/0xcd

[   82.144374] Freed by task 158:
[   82.144376]  kasan_save_stack+0x26/0x50
[   82.144378]  kasan_set_track+0x25/0x40
[   82.144380]  kasan_save_free_info+0x2e/0x50
[   82.144382]  ____kasan_slab_free+0x174/0x1e0
[   82.144384]  __kasan_slab_free+0x12/0x20
[   82.144386]  slab_free_freelist_hook+0xd0/0x1a0
[   82.144388]  __kmem_cache_free+0x193/0x2c0
[   82.144391]  kfree+0x79/0x120
[   82.144393]  as102_usb_release+0x5d/0x75 [dvb_as102]
[   82.144397]  as102_usb_disconnect+0x125/0x176 [dvb_as102]
[   82.144400]  usb_unbind_interface+0x187/0x7c0
[   82.144402]  device_remove+0x117/0x170
[   82.144404]  device_release_driver_internal+0x418/0x660
[   82.144407]  device_release_driver+0x12/0x20
[   82.144409]  bus_remove_device+0x28f/0x540
[   82.144410]  device_del+0x501/0xc30
[   82.144413]  usb_disable_device+0x2a5/0x660
[   82.144415]  usb_disconnect.cold+0x1f9/0x620
[   82.144417]  hub_event+0x16d3/0x3d20
[   82.144420]  process_one_work+0x778/0x11c0
[   82.144422]  worker_thread+0x544/0x1180
[   82.144424]  kthread+0x280/0x320
[   82.144426]  ret_from_fork+0x1f/0x30
```


2. media: dvb-core: Fix use-after-free due to race condition occurring in dvb_net
This is a security patch for a race condition that occurs in the dvb_net system of dvb-core.

The race condition that occurs here will occur with _any_ device driver using dvb_net.

The race condition that occurs in dvb_net is:
```
                cpu0                                                    cpu1
       1. .disconnect()
          dvb_net_release()
          dvbnet->exit = 1;
          if (dvbnet->dvbdev->users < 1)  // improper reference counting
                                                                2. open()
                                                                   dvb_device_open()
```

```
                                                                down_read(&minor_rwsem);
                                                                dvb_generic_open()
                                                                dvbdev->users--;      // race condition
                                                                up_read(&minor_rwsem);
       3. dvb_unregister_device()
          dvb_remove_device()
          down_write(&minor_rwsem);
          dvb_minors[dvbdev->minor] = NULL;
          up_write(&minor_rwsem);
          dvb_free_device()
          kfree (dvbdev->fops);
                                                          4. close(fd)
                                                             __x64_sys_close()
                                                             close_fd()
                                                             filp_close()
                                                             retval = filp->f_op->flush(filp, id);    // UAF
```
After the 'if (dvbnet->dvbdev->users < 1)' conditional of dvb_net_release() passes,
'dvbdev->users--;' of dvb_generic_open() is executed, improper reference counting occurs.

The root cause of this is that you use the dvb_device_open() function,
which does not implement a conditional statement that checks 'dvbnet->exit'.

The KASAN log caused by this is as follows:
```
[  952.372616] ==================================================================
[  952.372639] BUG: KASAN: use-after-free in filp_close+0x119/0x140
[  952.372667] Read of size 8 at addr ffff888118abec78 by task dvb_net_test/2522

[  952.372690] CPU: 3 PID: 2522 Comm: dvb_net_test Not tainted 6.1.0-rc2+ #16
[  952.372707] Hardware name: Gigabyte Technology Co., Ltd. B460MDS3H/B460M DS3H, BIOS F3 05/27/2020
[  952.372718] Call Trace:
[  952.372727]  <TASK>
[  952.372736]  dump_stack_lvl+0x49/0x63
[  952.372754]  print_report+0x177/0x46e
[  952.372775]  ? kasan_complete_mode_report_info+0x7c/0x210
[  952.372791]  ? filp_close+0x119/0x140
[  952.372810]  kasan_report+0xb0/0x140
[  952.372830]  ? filp_close+0x119/0x140
[  952.372850]  __asan_report_load8_noabort+0x14/0x20
[  952.372865]  filp_close+0x119/0x140
[  952.372883]  close_fd+0x75/0x90
[  952.372897]  __x64_sys_close+0x30/0x80
[  952.372915]  do_syscall_64+0x59/0x90
[  952.372930]  ? fpregs_assert_state_consistent+0x52/0xc0
[  952.372950]  ? exit_to_user_mode_prepare+0x49/0x1a0
[  952.372965]  ? syscall_exit_to_user_mode+0x26/0x50
[  952.372984]  ? do_syscall_64+0x69/0x90
[  952.373000]  entry_SYSCALL_64_after_hwframe+0x63/0xcd
[  952.373016] RIP: 0033:0x4537eb
[  952.373031] Code: 03 00 00 00 0f 05 48 3d 00 f0 ff ff 77 41 c3 48 83 ec 18 89 7c 24 0c e8 c3 a8 02 00 8b 7c 24 0c 41 89 c0 b8 03 00 00 00 0f 05 <48> 3d 00 f0 ff ff 77 35 44 89 c7 89 44
24 0c e8 11 a9 02 00 8b 44
[  952.373046] RSP: 002b:00007f98078001a0 EFLAGS: 00000293 ORIG_RAX: 0000000000000003
[  952.373066] RAX: ffffffffffffffda RBX: 00007f9807800640 RCX: 00000000004537eb
[  952.373078] RDX: 0000000000000000 RSI: 00007f9800000b70 RDI: 0000000000000003
[  952.373089] RBP: 00007f98078001d0 R08: 0000000000000000 R09: 0000000000000000
[  952.373100] R10: 00007f9807800180 R11: 0000000000000293 R12: 00007f9807800640
[  952.373111] R13: 0000000000000000 R14: 000000000041b290 R15: 00007f9807000000
[  952.373130]  </TASK>

[  952.373145] Allocated by task 592:
[  952.373155]  kasan_save_stack+0x26/0x50
[  952.373171]  kasan_set_track+0x25/0x40
[  952.373185]  kasan_save_alloc_info+0x1e/0x30
[  952.373195]  __kasan_kmalloc+0xb4/0xc0
[  952.373212]  __kmalloc_node_track_caller+0x66/0x160
[  952.373233]  kmemdup+0x23/0x50
[  952.373250]  dvb_register_device+0x1cd/0x15c0 [dvb_core]
[  952.373301]  dvb_net_init+0xc7/0x100 [dvb_core]
[  952.373348]  ttusb_dec_probe.cold+0x14de/0x1f1e [ttusb_dec]
[  952.373373]  usb_probe_interface+0x266/0x740
[  952.373388]  really_probe+0x1fa/0xa80
[  952.373400]  __driver_probe_device+0x2cb/0x490
[  952.373412]  driver_probe_device+0x4e/0x140
[  952.373424]  __device_attach_driver+0x197/0x2b0
[  952.373437]  bus_for_each_drv+0x129/0x1c0
[  952.373447]  __device_attach+0x2ad/0x4f0
[  952.373459]  device_initial_probe+0x13/0x20
[  952.373470]  bus_probe_device+0x198/0x240
[  952.373481]  device_add+0xa1b/0x1cc0
[  952.373491]  usb_set_configuration+0x9ca/0x17f0
[  952.373502]  usb_generic_driver_probe+0x86/0xb0
[  952.373513]  usb_probe_device+0xa7/0x260
[  952.373524]  really_probe+0x1fa/0xa80
[  952.373535]  __driver_probe_device+0x2cb/0x490
[  952.373547]  driver_probe_device+0x4e/0x140
[  952.373558]  __device_attach_driver+0x197/0x2b0
[  952.373570]  bus_for_each_drv+0x129/0x1c0
[  952.373580]  __device_attach+0x2ad/0x4f0
[  952.373591]  device_initial_probe+0x13/0x20
[  952.373603]  bus_probe_device+0x198/0x240
[  952.373614]  device_add+0xa1b/0x1cc0
[  952.373623]  usb_new_device.cold+0x462/0xc46
[  952.373637]  hub_event+0x1d23/0x3d20
[  952.373652]  process_one_work+0x778/0x11c0
[  952.373664]  worker_thread+0x544/0x1180
[  952.373676]  kthread+0x280/0x320
[  952.373686]  ret_from_fork+0x1f/0x30

[  952.373707] Freed by task 592:
[  952.373717]  kasan_save_stack+0x26/0x50
[  952.373731]  kasan_set_track+0x25/0x40
[  952.373744]  kasan_save_free_info+0x2e/0x50
[  952.373754]  ____kasan_slab_free+0x174/0x1e0
[  952.373767]  __kasan_slab_free+0x12/0x20
[  952.373780]  slab_free_freelist_hook+0xd0/0x1a0
[  952.373793]  __kmem_cache_free+0x193/0x2c0
[  952.373805]  kfree+0x79/0x120
[  952.373817]  dvb_free_device.part.0+0x33/0x70 [dvb_core]
[  952.373858]  dvb_unregister_device+0x40/0x54 [dvb_core]
[  952.373905]  dvb_net_release+0x264/0x316 [dvb_core]
[  952.373952]  ttusb_dec_disconnect+0x391/0x4e1 [ttusb_dec]
[  952.373973]  usb_unbind_interface+0x187/0x7c0
[  952.373986]  device_remove+0x117/0x170
[  952.373997]  device_release_driver_internal+0x418/0x660
[  952.374010]  device_release_driver+0x12/0x20
[  952.374022]  bus_remove_device+0x28f/0x540
[  952.374032]  device_del+0x501/0xc30
[  952.374047]  usb_disable_device+0x2a5/0x660
[  952.374058]  usb_disconnect.cold+0x1f9/0x620
[  952.374070]  hub_event+0x16d3/0x3d20
[  952.374084]  process_one_work+0x778/0x11c0
[  952.374096]  worker_thread+0x544/0x1180
[  952.374107]  kthread+0x280/0x320
[  952.374117]  ret_from_fork+0x1f/0x30
```


3. media: dvb-core: Fix use-after-free due to race condition occurring in dvb_register_device()
This is a security patch for a race condition that occurs in the dvb_register_device() function.

This race condition can occur _anywhere_ the dvb_register_device() function is called:
dvb_demux, dvb_dvr, dvb_frontend, dvb_net, etc.

The race condition flow is as follows (dvb_net is used as an example):
```
              cpu0                                              cpu1
       1. open()
          dvb_device_open()
```

```
       2. close()
          __fput()
          dvb_net_close()
                                                        3. .disconnect()
                                                           dvb_net_release()
                                                           dvb_unregister_device()
                                                           dvb_free_device()
                                                           kfree (dvbdev->fops);
       4. ...
          fops_put(file->f_op);    // UAF!!
```
UAF occurs in '.probe -> open() -> close() -> .disconnect' flow.

The root cause of this is that fops used as an argument of replace_fops() in dvb_device_open()
are kfree()d in the .disconnect flow.
It's not common for fops used in replace_fops() to be dynamically allocated and kfree()d like this.

The KASAN log caused by this is as follows:
```
[   67.857811] ==================================================================
[   67.857830] BUG: KASAN: use-after-free in __fput+0xa55/0xaf0
[   67.857855] Read of size 8 at addr ffff88810f7dfc00 by task dvb_net_fput/2152

[   67.857879] CPU: 15 PID: 2152 Comm: dvb_net_fput Not tainted 6.1.0-rc2+ #17
[   67.857896] Hardware name: Gigabyte Technology Co., Ltd. B460MDS3H/B460M DS3H, BIOS F3 05/27/2020
[   67.857907] Call Trace:
[   67.857917]  <TASK>
[   67.857928]  dump_stack_lvl+0x49/0x63
[   67.857947]  print_report+0x177/0x46e
[   67.857967]  ? kasan_complete_mode_report_info+0x7c/0x210
[   67.857984]  ? __fput+0xa55/0xaf0
[   67.858001]  kasan_report+0xb0/0x140
[   67.858021]  ? __fput+0xa55/0xaf0
[   67.858039]  __asan_report_load8_noabort+0x14/0x20
[   67.858053]  __fput+0xa55/0xaf0
[   67.858072]  ____fput+0xe/0x20
[   67.858087]  task_work_run+0x153/0x240
[   67.858108]  ? task_work_cancel+0x20/0x20
[   67.858127]  ? fput+0xab/0x140
[   67.858144]  exit_to_user_mode_prepare+0x18f/0x1a0
[   67.858160]  syscall_exit_to_user_mode+0x26/0x50
[   67.858179]  do_syscall_64+0x69/0x90
[   67.858194]  ? exit_to_user_mode_prepare+0x49/0x1a0
[   67.858208]  ? irqentry_exit_to_user_mode+0x9/0x20
[   67.858226]  ? irqentry_exit+0x3b/0x50
[   67.858243]  ? exc_page_fault+0x72/0xf0
[   67.858262]  entry_SYSCALL_64_after_hwframe+0x63/0xcd
[   67.858278] RIP: 0033:0x4537eb
[   67.858294] Code: 03 00 00 00 0f 05 48 3d 00 f0 ff ff 77 41 c3 48 83 ec 18 89 7c 24 0c e8 c3 a8 02 00 8b 7c 24 0c 41 89 c0 b8 03 00 00 00 0f 05 <48> 3d 00 f0 ff ff 77 35 44 89 c7 89 44
24 0c e8 11 a9 02 00 8b 44
[   67.858309] RSP: 002b:00007f607be001a0 EFLAGS: 00000293 ORIG_RAX: 0000000000000003
[   67.858330] RAX: 0000000000000000 RBX: 00007f607be00640 RCX: 00000000004537eb
[   67.858343] RDX: 0000000000000000 RSI: 00007f6074000b70 RDI: 0000000000000003
[   67.858353] RBP: 00007f607be001d0 R08: 0000000000000000 R09: 0000000000000000
[   67.858364] R10: 00007f607be00180 R11: 0000000000000293 R12: 00007f607be00640
[   67.858375] R13: 0000000000000000 R14: 000000000041b2a0 R15: 00007f607b600000
[   67.858392]  </TASK>

[   67.858407] Allocated by task 2125:
[   67.858417]  kasan_save_stack+0x26/0x50
[   67.858433]  kasan_set_track+0x25/0x40
[   67.858447]  kasan_save_alloc_info+0x1e/0x30
[   67.858456]  __kasan_kmalloc+0xb4/0xc0
[   67.858469]  __kmalloc_node_track_caller+0x66/0x160
[   67.858483]  kmemdup+0x23/0x50
[   67.858495]  dvb_register_device+0x1cd/0x15c0 [dvb_core]
[   67.858543]  dvb_net_init+0xe1/0x120 [dvb_core]
[   67.858591]  ttusb_dec_probe.cold+0x14de/0x1f1e [ttusb_dec]
[   67.858615]  usb_probe_interface+0x266/0x740
[   67.858629]  really_probe+0x1fa/0xa80
[   67.858642]  __driver_probe_device+0x2cb/0x490
[   67.858654]  driver_probe_device+0x4e/0x140
[   67.858666]  __driver_attach+0x1a3/0x520
[   67.858677]  bus_for_each_dev+0x11e/0x1c0
[   67.858688]  driver_attach+0x3d/0x60
[   67.858699]  bus_add_driver+0x449/0x5a0
[   67.858710]  driver_register+0x219/0x390
[   67.858722]  usb_register_driver+0x228/0x400
[   67.858733]  0xffffffffc0506023
[   67.858744]  do_one_initcall+0x97/0x310
[   67.858758]  do_init_module+0x19a/0x630
[   67.858770]  load_module+0x6ca4/0x7d90
[   67.858781]  __do_sys_finit_module+0x134/0x1d0
[   67.858792]  __x64_sys_finit_module+0x72/0xb0
[   67.858803]  do_syscall_64+0x59/0x90
[   67.858815]  entry_SYSCALL_64_after_hwframe+0x63/0xcd

[   67.858834] Freed by task 666:
[   67.858843]  kasan_save_stack+0x26/0x50
[   67.858857]  kasan_set_track+0x25/0x40
[   67.858870]  kasan_save_free_info+0x2e/0x50
[   67.858880]  ____kasan_slab_free+0x174/0x1e0
[   67.858893]  __kasan_slab_free+0x12/0x20
[   67.858907]  slab_free_freelist_hook+0xd0/0x1a0
[   67.858919]  __kmem_cache_free+0x193/0x2c0
[   67.858932]  kfree+0x79/0x120
[   67.858944]  dvb_free_device.part.0+0x33/0x70 [dvb_core]
[   67.858984]  dvb_unregister_device+0x40/0x54 [dvb_core]
[   67.859032]  dvb_net_release+0x267/0x319 [dvb_core]
[   67.859080]  ttusb_dec_disconnect+0x391/0x4e1 [ttusb_dec]
[   67.859102]  usb_unbind_interface+0x187/0x7c0
[   67.859115]  device_remove+0x117/0x170
[   67.859126]  device_release_driver_internal+0x418/0x660
[   67.859139]  device_release_driver+0x12/0x20
[   67.859150]  bus_remove_device+0x28f/0x540
[   67.859161]  device_del+0x501/0xc30
[   67.859176]  usb_disable_device+0x2a5/0x660
[   67.859187]  usb_disconnect.cold+0x1f9/0x620
[   67.859200]  hub_event+0x16d3/0x3d20
[   67.859215]  process_one_work+0x778/0x11c0
[   67.859228]  worker_thread+0x544/0x1180
[   67.859239]  kthread+0x280/0x320
[   67.859249]  ret_from_fork+0x1f/0x30
```


4. media: ttusb-dec: Fix memory leak in ttusb_dec_exit_dvb()
This is a patch for a memory leak that occurs in the ttusb_dec_exit_dvb() function.

Because ttusb_dec_exit_dvb() does not call dvb_frontend_detach(),
several fe related structures are not kfree()d.

Users can trigger a memory leak just by repeating connecting and disconnecting
the ttusb_dec device.

Finally, most of these patches are similar to this one, the security patch for
CVE-2022-41218 that I reported:
https://lore.kernel.org/linux-media/20221031100245.23702-1-tiwai@suse.de/

Regards,
Hyunwoo Kim

Hyunwoo Kim (4):
  media: dvb-core: Fix use-after-free due to race condition occurring in
    dvb_frontend
  media: dvb-core: Fix use-after-free due to race condition occurring in
    dvb_net

```
  media: dvb-core: Fix use-after-free due to race condition occurring in
    dvb_register_device()
  media: ttusb-dec: Fix memory leak in ttusb_dec_exit_dvb()

 drivers/media/dvb-core/dvb_frontend.c   | 39 ++++++++++--
 drivers/media/dvb-core/dvb_net.c        | 37 ++++++++++-
 drivers/media/dvb-core/dvbdev.c         | 83 +++++++++++++++++++++-------
 drivers/media/usb/ttusb-dec/ttusb_dec.c |  3 +-
 include/media/dvb_frontend.h            |  6 +-
 include/media/dvb_net.h                 |  4 ++
 include/media/dvbdev.h                  | 15 +++++
 7 files changed, 155 insertions(+), 32 deletions(-)

--
2.25.1
```
