

# Upgrade Guide

## 5G Device Modem Firmware



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5G Device Modem Firmware Upgrade Guide

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# Overview

Fortinet 5G devices, such as FortiGate/FortiWifi 50G-5G (FG/FWF 50G-5G), FortiGate Rugged 60G-5G-Series (FGR-60G-5G), and FortiGate Rugged 70G-5G-Dual (FGR-70G-5G-DUAL), come with the Telit FN990A28 5G internal modem to provide wireless connectivity. The modem is supported by major wireless carriers across Americas, Asia, the EU, and some other parts of the world.

This *Guide* provides information and instructions about how to upgrade the modem firmware image on these Fortinet 5G devices. It also discusses how to recover the modem if you encounter issues during modem firmware upgrade.

# Get modem firmware image files

To obtain the modem firmware image files, please contact [Fortinet Support](#) for assistance.

# Get matching .bin files

Each modem firmware package contains a .bin file and .contents file:

- FN990A28\_45.00.003\_CUST\_9012\_MI\_SIGNED\_STREAM.bin
- FN990A28\_45.00.003\_CUST\_9012\_MI\_SIGNED\_STREAM.contents

# Prepare for image upgrade

Before starting to upgrade your 5G device modem firmware, ensure that:

- The modem model and firmware version match the firmware image files to be upgraded.
- The device is powered up.
- The device is connected to the network.



Do this *only* if you are upgrading your modem firmware from an FTP or TFTP server, or directly from the carrier's website.

- 
- The new firmware image files are available on a desired download location or media, which can be an FTP or TFTP server, or a USB disk.



Ignore this if you are upgrading directly from the carrier's website.

---

# Manual firmware upgrade

You can use the "execute 5g-modem firmware-upgrade" command with any of the following options to upgrade your modem firmware:

```
execute 5g-modem firmware-upgrade
ftp          Load image from FTP server.
management-station Restore image from Management station.
tftp        Restore image from TFTP server.
usb         Restore image from USB disk.
```

- [execute 5g-modem firmware-upgrade ftp \[ImageFile\] \[FTP Server\]:Port \(username\) \(password\) on page 8](#)
- [execute 5g-modem firmware-upgrade management-station ? on page 9](#)
- [execute 5g-modem firmware-upgrade tftp \[ImageFile\] \[TFTP Server\] on page 9](#)
- [execute 5g-modem firmware-upgrade usb \[ImageFile\] on page 10](#)

## execute 5g-modem firmware-upgrade ftp [ImageFile] [FTP Server]:Port (username) (password)

This command lets you upgrade your modem firmware using FTP. You must provide the name of the firmware image file, the IP address and port number of the FTP server where the firmware file resides, and your username and password for that FTP server, as illustrated in the following example:

```
FortiWiFi-50G-5G # execute 5g-modem firmware-upgrade ftp FN990A28_45.00.0X3-B002_CUST_3200_MI_
SIGNED_STREAM.bin 10.160.33.237:21 testuser a
Please wait...

Connect to ftp server 10.160.33.237:21 ...
Get image from ftp server OK.
starting modem1 firmware upgrade process, this may take several minutes...
modem1 firmware upgrade successfully
```

## execute 5g-modem firmware-upgrade management-station ?

This command enables you to manually upgrade your modem firmware at any time from the "management-station", which is FortiGuard.

```
FortiWiFi-50G-5G # execute 5g-modem firmware-upgrade management-station ?
Available modem firmware <version_id>:
M0R.000003

FortiWiFi-50G-5G # execute 5g-modem firmware-upgrade management-station M0R.000003
Please wait...

Getting image 01003000MIMG00000 from Management station...
#####
starting modem1 firmware upgrade process, this may take several minutes...
modem1 firmware upgrade successfully
```



For instructions about how to schedule auto modem firmware upgrade from FortiGuard, see [Scheduled auto firmware upgrade from FortiGuard on page 12](#).

## execute 5g-modem firmware-upgrade tftp [ImageFile] [TFTP Server]

This command lets you upgrade your modem firmware using TFTP. You need to provide the name of the firmware image file and the IP address of the TFTP server where the firmware file resides, as illustrated in the following example:

```
FortiWiFi-50G-5G # execute 5g-modem firmware-upgrade tftp FN990A28_45.00.002_CUST_2071_MI_
STREAM.bin 10.160.33.51
Please wait...

Connect to tftp server 10.160.33.51 ...

#####
#####
#####

Get image from tftp server OK.
starting modem1 firmware upgrade process, this may take several minutes...
modem1 firmware upgrade successfully
```

```
FortiGateRugged-FGR-5G-D (global) # execute 5g-modem firmware-upgrade tftp FN990A28_45.00.002_
CUST_2071_MI_STREAM.bin 10.160.33.51 2
Please wait...

Connect to tftp server 10.160.33.51 ...

#####
#####
#####

Get image from tftp server OK.
starting modem2 firmware upgrade process, this may take several minutes...
modem2 firmware upgrade successfully
```

FGR-5G-D devices let you choose the modem or modems to upgrade, as illustrated in the following code sample:

```
FortiGateRugged-FGR-5G-D # execute 5g-modem firmware-upgrade ftp/tftp/usb xxx
< 1 | 2 | all> modem entry.
```

However, the processes for upgrading modem1 and modem2 firmware are different:

- Modem1: Call the firmware upgrade binary directly.
- Modem2: Reboot first, and then call the firmware upgrade binary.



See the following code sample:

```
Getting image 01003000MIMG00000 from Management station...
#####
Starting modem1 firmware upgrade process, this may take several minutes...
Modem1 firmware upgrade successfully
Modem2 will now reboot to get the latest firmware upgrade port, please wait
.....Wait modem2 bootup.....
Starting modem2 firmware upgrade process, this may take several minutes...
Modem2 firmware upgrade successfully
```

## execute 5g-modem firmware-upgrade usb [ImageFile]

This command lets you upgrade your modem firmware using a USB drive. You must specify the name of the firmware image file, as illustrated in the following example:

```
FortiWiFi-50G-5G # execute 5g-modem firmware-upgrade usb FN990A28_45.00.0X3-B002_CUST_3200_MI_
SIGNED_STREAM.bin
Please wait...

Copy image FN990A28_45.00.0X3-B002_CUST_3200_MI_SIGNED_STREAM.bin from USB disk ...
```

```
Get image from USB disk OK.  
starting modem1 firmware upgrade process, this may take several minutes...  
modem1 firmware upgrade successfully
```

# Scheduled auto firmware upgrade from FortiGuard

This section provides instructions about how to use FortiGuard to schedule and manage automatic upgrade of your Fortinet 5G device modem firmware. It covers the following topics:

- [Firmware upgrade commands on page 12](#)
- [Set a firmware upgrade schedule on page 13](#)
- [Set upgrade frequency on page 15](#)
- [Cancel an upgrade schedule on page 19](#)
- [View scheduled auto-upgrade status on page 20](#)

## Firmware upgrade commands

Setting firmware upgrade schedules using FortiGuard enables your Fortinet 5G device with the internal Telit 5G modem to auto-check for firmware upgrade packages, and upgrade its modem firmware via FortiCloud according to the schedules configured in the system.

You can specify an auto-check update date and time with the system's central-management settings, as illustrated in the following code example:

```
FortiWiFi-50G-5G # config sys central-management

FortiWiFi-50G-5G (central-management) # set
mode                               Central management mode.
type                               Central management type.
schedule-config-restore            Enable/disable allowing the central management server to
restore the configuration of this FortiGate.
schedule-script-restore            Enable/disable allowing the central management server to
restore the scripts stored on this FortiGate.
allow-push-configuration            Enable/disable allowing the central management server to
push configuration changes to this FortiGate.
allow-push-firmware                Enable/disable allowing the central management server to
push firmware updates to this FortiGate.
allow-remote-firmware-upgrade       Enable/disable remotely upgrading the firmware on this
FortiGate from the central management server.
allow-remote-modem-firmware-upgrade Enable/disable remotely upgrading the internal cellular
modem firmware on this FortiGate from the central management server.
modem-upgrade-time                  Schedule next internal cellular modem firmware upgrade time
(Local Time). Format: YYYY-MM-DD HH:MM:SS
modem-upgrade-frequency             Set internal cellular modem firmware auto pushdown
frequency.
allow-monitor                        Enable/disable allowing the central management server to
```

```
remotely monitor this FortiGate unit.
local-cert          Certificate to be used by FGFM protocol.
vdom               Virtual domain (VDOM) name to use when communicating with
FortiManager.
fmg-update-port    Port used to communicate with FortiManager that is acting
as a FortiGuard update server.
enc-algorithm      Encryption strength for communications between the
FortiGate and central management.

FortiWiFi-50G-5G (central-management) # end
```



The following three settings are needed to schedule a firmware upgrade:

- `allow-remote-modem-firmware-upgrade`
- `modem-upgrade-time`
- `modem-upgrade-frequency`

By default, the "allow-remote-modem-firmware-upgrade" is enabled.



Disabling "allow-remote-modem-firmware-upgrade" automatically cancels all set schedules, but does not remove them from the system. The schedules will be activated again when "allow-remote-modem-firmware-upgrade" is enabled.

## Set a firmware upgrade schedule

You can use the "set modem-upgrade-time" command to set a firmware upgrade time.



The command requires either of the following time formats:

- "yyyymmdd hh:mm:ss"
- "hh:mm:ss"

Both formats use your local time as input. The former lets you specify a future date and the time of the day, while the latter asks you to specify the time of the day only, as illustrated in the following example.

```
FortiWiFi-50G-5G # config sys central-management

FortiWiFi-50G-5G (central-management) # set modem-upgrade-time
"yyyymmdd hh:mm:ss" or "hh:mm:ss" Date and Time (yyyymmdd: 0-9999, mm: 1-12, dd: 1-31, hh: 0-23,
mm: 0-59, ss: 0-59).

FortiWiFi-50G-5G (central-management) # set modem-upgrade-time "2024-02-17 08:00:00"

FortiWiFi-50G-5G (central-management) # show
config system central-management
set type fortiguard
set modem-upgrade-time "2024-02-17 08:00:00"
```

```
end
```

```
FortiWiFi-50G-5G (central-management) #
```



The aforementioned command is used to schedule firmware upgrade at a time in the future. Do NOT backdate an upgrade. Even though the system currently does not prevent you from doing so, backdating an upgrade will NOT trigger the upgrade immediately. It simply does not work!

Once a valid upgrade schedule is set, the timer is registered and the upgrade will be triggered according to the schedule. You can view this registered timer and its ticked schedule using the "diagnose test application forticldd 13" command, as shown in the following example:

```
FortiWiFi-50G-5G # diagnose test application forticldd 13
Scheduled image upgrade: no
Scheduled Config Restore: no
Scheduled Script Restore: no
Scheduled Cellular Modem Firmware Image Upgrade: on
    Cellular Modem Image next upgrade pushdown is scheduled at (UTC) Sat Feb 17 16:00:00 2024
```

In the illustration above, "on" means that the FortiCloud remote download service is enabled in the system, and the system will automatically start to check for and download the available modem firmware upgrade image according to the timer.



The date/time shown in the preceding example is in UTC format, which is different from the local-time format specified by user.



If a schedule is set already, resetting its date/time will overwrite the existing value and register a new timer with a new schedule ticked time.



After a schedule is registered, changing its time to an earlier time will cancel the registered timer, as shown in the following example:

```
FortiWiFi-50G-5G # diagnose test application forticldd 13
Scheduled image upgrade: no
Scheduled Config Restore: no
Scheduled Script Restore: no
Scheduled Cellular Modem Firmware Image Upgrade: on
    Cellular Modem Image next upgrade pushdown is scheduled at (UTC) Sat Feb 17 16:00:00 2024

FortiWiFi-50G-5G # config sys central-management

FortiWiFi-50G-5G (central-management) # show
config system central-management
    set type fortiguard
```

```
set modem-upgrade-time "2024-02-17 08:00:00"
end

FortiWiFi-50G-5G (central-management) # set modem-upgrade-time "2024-02-17 06:00:00"

FortiWiFi-50G-5G (central-management) # end

FortiWiFi-50G-5G # diagnose test application forticldd 13
Scheduled image upgrade: no
Scheduled Config Restore: no
Scheduled Script Restore: no
Scheduled Cellular Modem Firmware Image Upgrade: on
    Cellular Modem Image next upgrade pushdown is scheduled at (UTC) Sat Feb 17 14:00:00 2024

FortiWiFi-50G-5G # config sys central-management

FortiWiFi-50G-5G (central-management) # set modem-upgrade-time "2024-01-02 15:00:00"

FortiWiFi-50G-5G (central-management) # end

FortiWiFi-50G-5G # diagnose test application forticldd 13
Scheduled image upgrade: no
Scheduled Config Restore: no
Scheduled Script Restore: no
Scheduled Cellular Modem Firmware Image Upgrade: no
```

## Set upgrade frequency

You can use the "set modem-upgrade-frequency" command to specify how often you want the system to check for and download the latest firmware image for upgrade.

```
FortiWiFi-50G-5G # config sys central-management

FortiWiFi-50G-5G (central-management) # set modem-upgrade-frequency
everyHour      Auto check and pushdown internal cellular modem firmware every hour
every12hour    Auto check and pushdown internal cellular modem firmware every 12 hours
everyDay       Auto check and pushdown internal cellular modem firmware every day
everyWeek      Auto check and pushdown internal cellular modem firmware every week

FortiWiFi-50G-5G (central-management) # set modem-upgrade-frequency
```



The frequency value MUST be used in combination with the time value. Otherwise, it'll be meaningless and rejected by the system, as illustrated in the following example.

```
FortiWiFi-50G-5G # config sys central-management

FortiWiFi-50G-5G (central-management) # set modem-upgrade-frequency everyHour
```

```
A future upgrade time must be set first! Or use HH:MM:SS format for time.  
node_check_object fail! for modem-upgrade-frequency everyHour
```

```
value parse error before 'everyHour'  
Command fail. Return code -61
```

```
FortiWiFi-50G-5G (central-management) # set modem-upgrade-frequency everyHour  
A future upgrade time must be set first! Or use HH:MM:SS format for time.  
node_check_object fail! for modem-upgrade-frequency everyHour
```

```
value parse error before 'everyHour'  
Command fail. Return code -61
```



The proper way to set a upgrade schedule is to set the time first, and then set a desired reoccurring frequency, as shown in the following example.

```
FortiWiFi-50G-5G # config sys central-management
```

```
FortiWiFi-50G-5G (central-management) # sh  
config system central-management  
    set type fortiguard  
end
```

```
FortiWiFi-50G-5G (central-management) # set modem-upgrade-time "2024-02-17 12:00:00"
```

```
FortiWiFi-50G-5G (central-management) # set modem-upgrade-frequency everyDay
```

```
FortiWiFi-50G-5G (central-management) # show  
config system central-management  
    set type fortiguard  
    set modem-upgrade-time "2024-02-17 12:00:00"  
    set modem-upgrade-frequency everyDay  
end
```

```
FortiWiFi-50G-5G (central-management) # end
```

```
FortiWiFi-50G-5G # diagnose test application forticldd 13  
Scheduled image upgrade: no  
Scheduled Config Restore: no  
Scheduled Script Restore: no  
Scheduled Cellular Modem Firmware Image Upgrade: on  
    Cellular Modem Image next upgrade pushdown is scheduled at (UTC) Sat Feb 17 20:00:00 2024  
    Cellular Modem Image upgrade frequency is every 24 hours.
```

```
FortiWiFi-50G-5G #
```

Once scheduled, an auto upgrade will first take place at the immediate future upgrade time and then repeat at the set frequency. You can view the upgrade schedule using the "diagnose test application forticldd 13" command.



Setting a frequency to an earlier schedule time is equivalent to setting a frequency to a schedule with no time. FortiOS ignores backdated schedules, and will issue an error when it detects that you're trying to do so, as illustrated in the following example.

```
FortiWiFi-50G-5G (central-management) # show
config system central-management
  set type fortiguard
  set modem-upgrade-time "2023-02-02 12:00:00"
end

FortiWiFi-50G-5G (central-management) # set modem-upgrade-frequency everyDay
A future upgrade time must be set first! Or use HH:MM:SS format for time.
node_check_object fail! for modem-upgrade-frequency everyDay

value parse error before 'everyDay'
Command fail. Return code -61

FortiWiFi-50G-5G (central-management) #
```



The preceding code sample shows that if you use the HH:MM:SS format for the time string, setting the frequency will be allowed even though the specified time may have already passed. The expected behavior of this setting is that the next upgrade time is scheduled just one repeat interval away from the time of the day, as shown in the following example.

```
FortiWiFi-50G-5G # config sys central-management

FortiWiFi-50G-5G (central-management) # set modem-upgrade-time "10:00:00"

FortiWiFi-50G-5G (central-management) # set modem-upgrade-frequency everyDay

FortiWiFi-50G-5G (central-management) # show
config system central-management
  set type fortiguard
  set modem-upgrade-time "10:00:00"
  set modem-upgrade-frequency everyDay
end

FortiWiFi-50G-5G (central-management) # end

FortiWiFi-50G-5G # diagnose test application forticldd 13
Scheduled image upgrade: no
Scheduled Config Restore: no
Scheduled Script Restore: no
Scheduled Cellular Modem Firmware Image Upgrade: on
  Cellular Modem Image next upgrade pushdown is scheduled at (UTC) Sat Feb 17 18:00:00 2024
  Cellular Modem Image upgrade frequency is every 24 hours.

FortiWiFi-50G-5G #
```

As shown in the preceding example, it's already 18:00:00 when the user sets the upgrade time to 10:00:00. Still, the FortiCloud service allows the schedule timer to be ticked at 10:00:00 the following day. It is important to note that this exception only works when the upgrade time and frequency are set and committed in the same batch. In other words, if you set the schedule time (even in the HH:MM:SS format) and committed it earlier and then set the frequency at a later time, the latter will become undefined because the system refuses to calculate the next future upgrade time based on the detached past time and frequency, as shown in the following example:

```
FortiWiFi-50G-5G # config sys central-management
FortiWiFi-50G-5G (central-management) # set modem-upgrade-time "10:00:00"
FortiWiFi-50G-5G (central-management) # end
FortiWiFi-50G-5G # config sys central-management
FortiWiFi-50G-5G (central-management) # set modem-upgrade-frequency everyDay
FortiWiFi-50G-5G (central-management) # show
config system central-management
  set type fortiguard
  set modem-upgrade-time "10:00:00"
  set modem-upgrade-frequency everyDay
end
FortiWiFi-50G-5G (central-management) # end
FortiWiFi-50G-5G # diagnose test application forticldd 13
Scheduled image upgrade: no
Scheduled Config Restore: no
Scheduled Script Restore: no
Scheduled Cellular Modem Firmware Image Upgrade: no
FortiWiFi-50G-5G #
```



As shown in the preceding example, even though no timer is registered (meaning no upgrade is scheduled), the system still shows that a schedule (frequency and time) has been configured.

---

If an upgrade schedule has already been triggered for more than once, changing its frequency or time settings is not allowed unless you cancel the schedule entirely.

Note that the next upgrade time will not be updated in the configuration because the "show system central-management" command only shows the first upgrade time that you've specified.

You can use the "diagnose test application forticldd 13" command to view the actual next upgrade time. To prevent all devices from querying the FortiCloud server for firmware download at the same time, a randomization mechanism has been implemented and will kick in whenever an upgrade schedule is repeated at a set frequency, as shown in the following example.

```
FortiWiFi-50G-5G (central-management) # show
config system central-management
```

```
set type fortiguard
set modem-upgrade-time "15:40:00"
set modem-upgrade-frequency everyHour
end

FortiWiFi-50G-5G (central-management) # end

FortiWiFi-50G-5G # diagnose test application forticldd 13
Scheduled image upgrade: no
Scheduled Config Restore: no
Scheduled Script Restore: no
Scheduled Cellular Modem Firmware Image Upgrade: on
    Cellular Modem Image next upgrade pushdown is scheduled at (UTC) Sat Feb 17 00:39:30 2024
    Cellular Modem Image upgrade frequency is every 1 hours.
    Last upgrade was at (UTC) Fri Feb 16 23:40:00 2024

FortiWiFi-50G-5G #
```

The preceding illustration shows that, when the first upgrade operation is triggered, the following upgrade will be postponed by about three minutes instead of happening exactly one hour later as set in the scheduled frequency. With schedule time randomization, the actual upgrade time is within the +/- 3 minutes range of the scheduled time.

## Cancel an upgrade schedule

You can use the "unset modem-upgrade-frequency" command to cancel an upgrade schedule.



- If a schedule has already been used for more than once, unsetting its frequency will cancel the following schedule time even though it has already been calculated based on the frequency and auto-registered by the daemon.
- If the modem-upgrade-time is in the future (meaning the schedule has not taken effect yet), canceling the schedule frequency will stop the system from repeating the upgrade schedule in the future, but will not cancel the first upgrade based on the modem-upgrade-time. However, by unsetting modem-upgrade-time, you can cancel both the next schedule time and the frequency altogether.



We recommend using "unset modem-upgrade-time" to clear the existing schedule entirely before setting a new one.

```
FortiWiFi-50G-5G # diagnose test application forticldd 13
Scheduled image upgrade: no
Scheduled Config Restore: no
Scheduled Script Restore: no
Scheduled Cellular Modem Firmware Image Upgrade: on
    Cellular Modem Image next upgrade pushdown is scheduled at (UTC) Sat Feb 17 00:13:00 2024
```

Cellular Modem Image upgrade frequency is every 1 hours.

```
FortiWiFi-50G-5G # config sys central-management

FortiWiFi-50G-5G (central-management) # show
config system central-management
    set type fortiguard
    set modem-upgrade-time "15:40:00"
    set modem-upgrade-frequency everyHour
end

FortiWiFi-50G-5G (central-management) # unset modem-upgrade-time
This operation will also cancel the repeated upgrade routine! Upgrade frequency will now set to
None.
Do you want to continue? (y/n)y

FortiWiFi-50G-5G (central-management) # show
config system central-management
    set type fortiguard
end

FortiWiFi-50G-5G (central-management) # end

FortiWiFi-50G-5G # diagnose test application forticldd 13
Scheduled image upgrade: no
Scheduled Config Restore: no
Scheduled Script Restore: no
Scheduled Cellular Modem Firmware Image Upgrade: no
    Last upgrade was at (UTC) Fri Feb 16 23:40:00 2024

FortiWiFi-50G-5G #
```

## View scheduled auto-upgrade status

```
FortiWiFi-50G-5G # get sys status | grep "System time"
System time: Fri Feb 16 16:05:21 2024

FortiWiFi-50G-5G # config sys central-management

FortiWiFi-50G-5G (central-management) # set modem-upgrade-time "2024-02-16 16:10:00"

FortiWiFi-50G-5G (central-management) # set modem-upgrade-frequency everyHour

FortiWiFi-50G-5G (central-management) # end

Modem image upgrade from Management Station.
To stop the upgrade, please turn off allow-remote-modem-firmware-upgrade in sys.central-
management.
```

```
Perform modem firmware file object download...
Prepare for modem firmware upgrade...
start modem firmware upgrade...
Starting modem1 firmware upgrade process, this may take several minutes...
Modem1 firmware upgrade successfully
FortiWiFi-50G-5G # diagnose sys 5g-modem modem-details
-----
Modem detailed information:
-----
Manufacturer: Telit
Model: FN990A28
IMEI: 359918921133435
MEID: 35991892113343
Hardware revision: 1.00
Software revision: M0R.000003
Carrier config: Generic GCF
Carrier config PRI revision: 9012
Modem temperature: 36 C
Modem operation mode: ONLINE
Modem network mode: 3G|4G|5G
-----
```

# What's happening during the upgrade process

Once the upgrade process starts, the device starts to read the current image preference from the modem and saves it to the flash. This ensures that you can restore the existing working modem image in case the upgrade fails.

During the upgrade, you may run into issues such as interruption, missing firmware information, or image corruption, which will cause the upgrade to fail. If the modem doesn't work properly after upgrade, try to run the upgrade again. If the problem persists, contact Fortinet Support for assistance.

# Change Log

Date	Change Description
2026-02-05	Updated, adding <a href="#">Scheduled auto firmware upgrade from FortiGuard</a> on page 12.
2024-12-03	Initial release.



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