RuggedVPN Firmware Release 2020082070/2020102650 for Viprinet and Wantastic products; November 2020

This is our fourth firmware release this year.

Compared to 2018's release still done under the Viprinet brand, internally, a lot has changed in our firmware – this update is the result of over 10.000 hours of development work. A lot of code was rewritten to be faster and more future proof. Most importantly, the code for supporting 3G/4G modems had to be rewritten to be ready for supporting 5G chipsets in the future. Also, while the Multichannel VPN Router 310 originally was specified with a bonding capacity of 100 Mbit/s, with this Firmware we have been able to reach 250 Mbit/s under optimal scenarios. In most real-life cases you probably should be able to reach 200 Mbit/s.

In upcoming Firmware releases we plan to also speed up the 2620 router dramatically, and also hope to be able to speed up the 520 and Wantastic series, too.

Most of these changes had been introduced in our June 2020 release. This update is fixing a couple of remaining bugs, most importantly in the integrated LTE module firmware updater, which had lots of problems. This release is bringing a complete rewrite of the LTE module firmware updater, which now works in a stable fashion on all LTE module types.

Also the code that allows configuration, manages and reports Ethernet link speeds has been re-designed and re-written. It now uses an approach similar to how the LTE bands are managed by the user - you get a list of link modes the Ethernet chip supports, and can pick one or more of them. Picking one means it is enforced by turning off auto-negotiation. Selecting more than one means that the selected range (e.g. 100 and 1000 MBit/s, but not 10 MBit/s, never Half-Duplex) will be offered by the chip during auto-negotiation.

Important pre-installation instructions:

- **Protect the Elderly:** Very old routers (6+ years), especially Multichannel VPN Router 300 units that have been operated at sub-optimal temperature ranges often will have a faulty/very aged flash memory, and sometimes drained batteries or capacitors. Quite often they still work absolutely normally, but as soon as the flash is written, it fails. For those old routers installing this firmware update may cause the flash to finally die, with the router no longer starting.

  Therefore when updating those routers, please take extra care. Make sure you have taken a config backup, and have a replacement device in case something goes wrong.

  Please consider retiring old 300 Routers soon. Our VLM Support system allows your for very cost-efficient upgrades to the current 310 model.

- All code in regards of LTE modules has been rewritten. We have tested all UMTS/LTE module variants of the last 15 years extensively, but there may be problems, especially if you use custom APNs. If you are updating a router that is only connected via LTE modules, do it locally, not remotely via the VPN Tunnel.

- This firmware release is backward-compatible to the 2018 one. This means you can first upgrade the Hub, and then upgrade the Node router at a later point. Please note however that all performance enhancements will only be seen once both sides are updated.

Known issues:

- Switching between A/B SIM Card slots on Toughlink routers does not work, only the A slot is working in a stable fashion. This will be addressed in the next firmware release.

- If you power-cycle/reset an Ethernet Module configured to be using Static IP configuration inside the Web Interface, it will be coming back with DHCP configuration instead. This does not happen on Router power cycle, only when manually resetting the module inside the web Interface. The work-around is to set back the module to Static IP after doing such a power cycle. This problem will be fixed in the next firmware release.

For both of these issues customer may request a hot-fix firmware release for manual install on those routers from support@vlm.support in case they do not wish to wait until the next public stable firmware release.

Changes compared to the September 2020 (2020082070/2020082850) Release:

- In the 2018 the VPN Bypass features (which allows you to route some of your traffic to a local WAN module/port instead of the VPN) did not work fully for all WAN modules types. In the 2020 firmware releases the feature got broken fully. With this release, VPN Bypass now works fully and in a stable fashion for all WAN Module types again. The same goes for the “Module Browsing Tool” which allows you to use your Web browser for a couple of minutes using a single module directly, which is helpful if you want to reach some ISPs “please pay us more money” portal pages on blocked SIMs or to reach

- In all 2020 firmware releases the router stacking feature was mostly broken. It now works again in a stable fashion, including some better logic to resolve “split brain” situations where two routers losing connection to each other both believe to be the master router.

Changes compared to 2018's Releases:

New features and improvements:

- Dramatic improvements in product bonding performance. For this release, the highest speed-ups can be seen on 310 routers, which in real-life scenarios now have been seen to be able to bond up to 250 Mbit/s instead of the 100 Mbit/s they have been sold with. More speed-ups with a focus on other products will follow in later firmware releases.

- The system now supports LTE modules with multiple SIM card holders

- The system now supports the "Simergy" system of virtual remote SIMs.

- The LTE module firmware updater has been re-written and is now also able to flash LTE-A modules. Please update your LTE-A modules to the latest firmware.

- On the Multichannel VPN Router 52x and Toughlink 25xx series, or using a dedicated Simergy LTE Module on modular routers, you may now instead of having a local SIM inside the router use a physical SIM stored in a remote data center.

  > This is not to be confused with the eSIM system, where you would still provision a SIM onto the modem itself, which would then stay there. Instead you can buy cheap SIM cards and store them locally in your office or data center in a rack, and whereever your routers are, they will automatically fetch the remote SIM card best matching the currently seen LTE networks.

- The system makes managing a large pool of SIMs much easier, and provides a massive benefit for mobile routers travelling across country borders.

- The Gigabit Ethernet V2 module with Realtek chipset is now supported and works very well. This module has been created as the existing Gigabit Ethernet modules chipset had compatibility problems related to pause frames with various switches, and more importantly with some external routers (DSL, Cable).

  Those customers affected of getting low speeds using an external DSL or Cable modem on a Gigabit Ethernet module may upgrade to this new module as soon as Viprinet has started selling it.

- Added support for an upcoming new WLAN Client module.

- The whole system is now using UTF8 encoding, and therefore should be supporting Unicode characters everywhere.

- The web interface is internally using Websockets and is responding much faster.

- Bonding multiple channels with very different bandwidth values now works properly, as does channel auto-tuning for those.

  Long explanation:

  Whenever a channel was fully used for a moment (no tokens left) at this point in our calculation for the total potential bandwidth of a QoS class the bandwidth of this channel would not be taken into account for that moment. Due to this, the maximum allowed bandwidth per QoS would fluctuate or even oscillate: Due to the QoS class using the wrong total bandwidth, it would not use the actual speed the channels have available. This in turn means that some channels might not be used to their full current autotuning amount, which would result in these channels not increasing their autotuning.

- Increased aggressiveness of rapid autotuning so it tunes up speed faster.

- The logic that manages traffic flows has been rewritten and now should both correctly release flows and be much faster with a high number of flows, as flows that are idle are now tracked separately from those who are sending traffic. Having millions of concurrent flows no longer should be a performance problem.

- The maximum number of traffic flows per IP has been increased to 50.000. The timeout for UDP DNS queries has been lowered. In combination this should make sure heavily used DNS servers running behind a Viprinet router will no longer run out of flows.

- The SSL/TLS specification only allows a maximum TLS record size of 16kb. We've always "violated" this specification by using up to 32k records, which was still compatible.

- WAN modules now use the NCSI system to detect if Internet connectivity is available on a WAN module that is up. It will notify you both if you have a WAN link that has no Internet (for example because your LTE contract ran out of traffic) and if the provider is redirecting traffic to a captive portal (to provide a login page for WiFi hotspots, or for your LTE provider offering you to buy a traffic package).

  The system will report NSCI progress using the monitoring tool, too.

- LTE modems now send status messages to the monitoring tool on network scans.

- Most Collections (Lists) inside the web interface now feature an import/export from/to MS Office and Libreoffice. This is an experimental feature that still has problems.

- All collections and objects now allow to backup and restore.

- The routing logic has changed to now do a "smallest prefix match" instead of "first match".

Smaller networks are now winning over larger networks if both are matching.

As an example: Source IP 192.168.0.1 is tried to be routed.

We have 2 Routing rules:
192.168.0.0/24 -> Tunnel A
192.168.0.0/26 -> Tunnel B

This logic now selects Tunnel B instead of Tunnel A which was the case previously (because of first match).

- The dynamic routing system now also transfers the local received metrics and also takes the administrative distance (different for BGP, ospf etc.) into account for selecting the active route.

- Drastically increased the number of WAN Optimizer connections supported. We now support a total of 8192 WAN Optimizer connections.

- The APN auto-detection database has been updated, and will now provide correct APNs for far more networks.

- The decision if a channel is to be encrypted or unencrypted is now negotiated between Hub and Node (in a hopefully backward-compatible way). You no longer can end up in a situation where encryption is enabled on one side, but disabled on the other, causing the channels to constantly disconnect.

- The tunnel protocol will now send the MTU that the reporting router as able to accept. The default is 1500 to provide backward-compatibility to routers not yet knowing this command. This is in preparation of an upcoming release which will allow Jumbo Frames through the tunnel.

- Adapted the default QoS templates to not to use WAN Optimizer on Hubs, and to have less complex bonding priorities. To see this, use the "Restore Manufacturing Defaults" function of the QoS template.

  Hint: The WAN Optimizer setting is direction-dependent. Typically you want Wan Optizimizer on in your QoS on the Node, but off on the Hub. This way connections going out from the LAN will use the WAN Optimizer, but network scans coming in from the outside Internet won't get optimized.

- Set the default bonding priority for newly create Tunnels to cost only, which is more intuitive, as with no user configuration change after install this means all channels will be fully used.

Bug fixes:

- TCP SYN scans triggering the WAN Optimizer could result in WAN Opt connections never getting freed, causing the "GOWITHTHEFLOW" debug messages.

- The WAN Optimizer had a bug that could cause any TCP connection where the server instead of the client sends the first message to fail. Normally clients send first (HTTP, IMAP), but for SMTP the server first sends a banner.

- Dynamic routing now respects the "distributed" flag for all types of routes.

- Fixed sometimes broken LTE network names coming with 7 Bit encoding.

- Various fixes and improvements for SMS support.

- If a tunnel is disabled, it will now be forgotten after a disconnect immediately. This way a deleted tunnel (which must be disabled before deleting it) can no longer cause the router to crash if the node is reconnecting to it.

  This fixes:
  "Deleting a tunnel, that has been connected within the last 3 min crashes the hub."

- Increase maximum socket number on ARM products (Wantastic, 510, 520). This should fix these devices running out of file descriptors and rebooting after a while when using the WAN Optimizer heavily.

- Added detection and warning if VVH hypervisor does not have AES-NI (which it must have).

- WAN Optimizer was sometimes losing packets internally. This could reduce WAN Opt performance especially in cases where there was a lot of distance/latency outside of the tunnel (downloading from a server far away). The buffers have been increased.

- When selecting multiple objects of a collection in the tree view of the web interface, you would after selecting a couple get a stupid "do you wish to move to a different object blabla" pop-up message.

- Fixed internal errors in HTTP server if HEAD requests were received. OPTIONS now also is supported for CORS.

- In very rare cases the generation date of VLM licenses could cause a VLM license not to be accepted by a Router.

- When loading existing VPN Client accounts from the configuration on Router startup, important data was not set, potentially causing all kinds of weird problems on Hubs with VPN Clients. On Virtual Hubs it was impossible to enable such clients, too.

- Fixed problems of some LTE module settings sometimes getting lost on router restart.

- Fixed a bug in the SFTP code which might have caused certain SFTP backup scripts used to copy the router configuration to not work.

- If a tunnel was forced to reconnect (Reconnect-Button in the web interface), WAN Optimizer connections existing at this point may had kept sending traffic over the tunnel and also cause internal errors.

- Fixed a possible reason for sometimes the Hub thinking that their is a stacking split brain situation on the Node side, when there actually isn't.

- Various improvements and bugfixes for the SFTP subsystem. Now compatible with both OpenSSH, WinSCP and Filezilla. Uploads don't yet work and therefore are disabled.

- Fix for QoS getting sometimes stuck with very slow lines and lots of QoS classes

- Fix for WAN Optimizer connections from Youtube streaming suddenly eating 100% CPU

- Unsupported LTE modem firmware is reported as such

- Removed forgotten debug for congestion notifications

- Fixed initialization code of LTE modules. Before it would try to connect the module when it wasn't ready yet (SIM card not read, or currently scanning networks etc). This fixes sometimes the modules not coming up after a router power cycle on Toughlink.

- Fixed a rare bug where an LTE module with lots of reconnects or cell tower changes while driving caused the tunnel suddenly to no longer work without any of our watchdogs coming to the rescue.

- The default DHCP server configuration got optimized, and work-arounded problems that occurred with some DHCP clients (notably FireTV sticks)

- The VPN Bypass code could on massive LTE module reconnects or powercycles cause the routing core to stop working without any of our watchdogs kicking in.

- Removed "switch to sim a/b" buttons for Toughlink devices

- Sometimes some or all of the web interface tools (download, ping, traceroute etc) would not work. This especially happened with low-speed or long-distance Browser connections to the web interface. This problem is fixed, all web interface tools now always work.