



RFD Modem Support FAQs

RFDdesign Pty Ltd
7/1 Stockwell Place
Archerfield, QLD 4108
rfdesign.com.au

Question/Issue:

My modems will not connect

Answer checklist:

1. Confirm that both modems flash a green LED when powered up. This indicates the modem is operating and searching for a link. If the LED is solid green on both modems, then they have connected, and issue may be with connection quality. (See below "My modems drop connection") If either, or both LEDs are solid red then the modems are in bootloader mode. (See below "My modem has a solid red LED")
2. Verify that both modems are compatible types. The +, u series and original RFD900 (aka a) series modems will interoperate and can even be connected to the 3dr radios. The x series cannot interoperate with older series due to the new microcontroller causing timing differences.
3. Check that the same version of firmware is on both modems. This is particularly important with the x series as changes to timings and settings during development can cause issues between firmware versions. The recommended SiK version for the x series modems is 2.65 or 3.07 and for + and u series is 1.91
4. Do a factory reset on both modems. Often there is a change to one parameter on a single modem causing issues with the link.
5. Check the number of channels setting on the modems. On some modems the default number of channels is too high, and this can cause connection issues. This is most common with the 868 models due to the smaller band for operation, but some plus model firmware also misconfigures the 900s. The correct channel number for the default bands is 20 for the 900s and 4 for the 868s. For arbitrary bands as a rule of thumb take the size of the channel band in MHz and divide by 0.65 then round down to the nearest whole number.

e.g. Number of channels = $\text{Floor}((\text{MaxFreqMHz} - \text{MinFreqMHz}) / 0.65)$

Example: Number of channels = $\text{Floor}((928 - 910) / 0.65)$

= $\text{Floor}(27.69)$

= 27

Question/Issue:

My modems drop connection/ take a long time to connect/ parameter loading in mission planner is slow

Answer checklist:

1. Follow 1 to 3 of “Modems will not connect”
2. Setup modems approximately 1 metre apart with one vertical antenna on each (preferably dipole antennas) with at least one modem connected to the PC. Wait for modems to connect and run an RSSI test, using AT command ‘AT&T=RSSI’, through a terminal or, by review the RSSI values from the mission planner logs if available. The local and remote (L/R) values should be within 5 points of each other and both should exceed 200, with the modems set to 20dBm or more output power. If one value is significantly lower than the other (>20 difference in RSSI) then there is likely a fault in the modem receiver filter and the faulty modem will need to be swapped out for a replacement unit.
3. If using the a, + or u series modem ensure that ECC and encryption are disabled. It is known that these features can cause issues with modem operation.
4. If using mavlink from a pixhawk then ensure that mavlink is enabled and hardware flow control is disabled on both modems. Also check that the correct serial speed setting is used on the pixhawk.
5. Mav2 protocol is only supported on the x series modems and only on version 2.65 or later firmware it is detected automatically and does not require any settings other than S6 (mavlink framing) = 1.

Question/Issue:

The range of my modems is poor:

Answer checklist.

1. Follow 1 to 3 of “My modems drop connection”
2. Confirm that the modems are being operated as line of sight as this is how the modems are designed to be used.
3. Check the noise figure (noise R/L) from the RSSI test/logs to see if this is high (generally greater than 85). If so, this indicates that there is significant noise on the modem band, that could be interfering with your operation.
4. Increase the modem power to extend the range. (It is the users responsibility to know the allowable power settings and frequencies in their area of operations.)
5. It is recommended that at least dipole antennas or RFDflex1s are used particularly for longer ranges. Monopoles will often perform sub-optimally as correct setup of antenna and ground plane for maximum performance can be time consuming or impractical due to mechanical restrictions.
6. Try to elevate the ground control antenna. This will increase the radio horizon, improve the line of sight and lessen the ground interference. At least 2 meters is recommended.
7. Check the specification of the RF extension cable in use as this can have significant loss per metre reducing signal power.
8. If using a long USB cable or USB extension the power drop on the cable may cause the modem to brownout or reset during use at high power. It is recommended to use a separate power supply of 5V and at least 1A of current. (Please note the voltage regulation is critical to avoid damage to the modems as even 5.3V for extended periods have been seen to damage the input regulator on the modem.)

Question/Issue:

My modem has a solid red LED

Answer checklist:

This indicates that the modem is stuck in bootloader mode

1. Try to reflash firmware using the RFD modem tools.
2. If the tools cannot establish boot mode try to manually force bootloader. This is done by holding a short, on pad one and two on the +, a and u modems, or, pad nine and shield for x series modems, as you apply power to the device. The pads are located between the pin header and shield of the modem and are numbered starting from pad one, the left most pad. After the power up, the short can be removed.
3. If, after several attempts at 2., the issue remains it will be necessary to contact your seller to arrange a modem swap.

Question/Issue:

My 868X modems have the wrong frequencies when I load firmware versions between 2.55 and 3.05

Or

My modem flashes a red LED for several seconds after power up.

Answer:

Your modem is likely one of a batch that have a factory fault affecting the calibration tables. You can confirm that there is a calibration table issue by loading the 3.07 firmware. If it fails to detect the factory calibration correctly it will load a default value and blink the red LED several times shortly after power up. These modems remain functional, and can continue to be used as normal with either version 2.53 or version 3.07 firmware, however if you wish you may contact us using support@rfdesign.com.au to discuss the issue further.

Question/Issue:

I cannot load older SiK or multipoint or asynchronous firmware on to my certified 900X modem.

Or

My certified modem has less options for settings.

Answer:

The range of certified modems that we sell require certain firmware versions in order to remain compliant. At this time that certification only allows for the use of v3.07 SiK firmware. New compliant version of the other firmware types may become available at a later date.

Certified modems have had some settings restricted in order to meet compliance requirements. This may include min and max frequencies, number of channels and duty cycles etc. It is still possible to use an unlocked modem with a locked version. It will however require that the modem be flashed to the same firmware version and that required settings are matched.

Note: Matching the settings of a certified modem on an unlocked modem does not certify the unlocked modem.

Question/Issue:

My issue is not related to the SiK firmware or this guide has not solved my problem.

Answer:

Please contact RF Design for further assistance. The easiest contact is to email us at support@rfdesign.com.au In the email please include the model of product that you are having issues with, the firmware version that you are using, the version of the RFD tools or the name of the software you are trying to interact with, a description of the issue, for multi-node networks the network design you are trying to use i.e. forwarding nodes, number of nodes, broadcast or directed communications etc. and finally include a screen capture or log of settings on your modem/s.