

## Windfreak SynthNV Serial Communications

This information is preliminary 2/2012

Talking to the WFNV unit is done through USB via a virtual serial / com port. The drivers supplied by WFT must be installed on your PC before communication can happen. After plugging in the hardware the com port will need to be identified, then used for any subsequent communication.

The first byte of any communication to the WFNV unit is the command byte. What this byte tells the unit to do is detailed below. Ideally a “package” is sent all at once. For example a communication for programming the whole PLL would consist of first the command byte of binary 00000001, and then 24 bytes which gives the 6 32 bit registers the PLL needs to be fully configured.

For commands that return information from the WFNV unit, such as reading the power detector, it is advisable to send the command and then read the bytes returned fairly quickly to get them out of the USB buffer in your PC.

Commands (byte value(dec)):

Command (1): write PLL Six Registers - 25 bytes sent

Command (2): write PLL Single Register - 5 bytes sent - used for quick frequency changes via PLL register 0

Command (3): write power setting to the Power Amplifier - 2 bytes sent, the last byte is the power but is only the 6 least significant bits of the byte. Bit 6 is LE of the power amp and bit 7 is PDB of the PLL. Both should be written as 1s for normal operation.

Command (4): analog read of power detector - 1 sent, 2 bytes returned?? Sometimes it returns more so its best to query the buffer and read all the bytes that are in there. This command will also toggle LED 4.

Command (5): store PLL six registers and PA 8 bits to eeprom – only command byte sent – nothing returned. This command will also toggle LED 3.

Command (6): Set internal or external reference. Send a 1 to send the pin that controls the reference high. Send 0 to drive the pin low.

Command (7): Read Firmware Version. SynthNV automatically sends text back resembling: "WFT SynthNV Version 1.2"

Command (8) Read Mux Out Reserved and not enabled in firmware version 1.2

Command (9) Run AM LUT with steptime delay plus # cycles.

Bytes are sent in order as:

lutsize // size in bytes of the lookup table  
stdammsb // step delay most significant byte  
stdamlsb // step delay least significant byte  
amrepmsb // repetition # most significant byte

amreplsb // repetition # least significant byte

lookup table // for the sine wave (or any arbitrary waveform) that is the size in bytes of "lutsize". Note all amplitude information is communicated via the LUT. There are limits to the size of LUT and v1.3 of the WF software uses a 32 byte LUT. Future software versions may adjust the LUT size for finer frequency control.

Note, this whole data packet is run every time an AM burst is needed. The processor disables all interrupts and cannot do anything until it is finished or reset. Beware your total duration. Keep duration less than 1mS for continuous operation because USB comm wont happen for a long delayed period otherwise. If a long period is saved to the EEPROM this could brick the SynthNV.

When sending the LUT. Bits 0-5 (6 least significant bits) of Port D contain the amplitude information. Bit 6 is LE for the PA and needs to stay high all the time. Bit 7 goes to PDBrf on the PLL chip.

Command (10): Run OOK pulse train on time, off time, # cycles.

stdonmsb // ON delay most significant byte

stdonlsb // ON delay least significant byte

stdoffmsb // OFF delay most significant byte

stdofflsb // OFF delay least significant byte

pulserepmsb // repetition # most significant bit

pulsereplsb // repetition # least significant bit

The amplitude of the pulse is controlled by the power command (3).

The off power is set in firmware as all VGA bits low and also PDBrf low for maximum off isolation.

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Command (11): Turn on continuous AM

Command (12): Turn off continuous AM

Command (13): Turn on continuous Pulse

Command (14): Turn off continuous Pulse

If serial is received by the WFNV unit, but the command is not recognized both LEDs will blink for a second. The USB buffer is also flushed.

On powerup the device will set itself up from EEPROM for one frequency, power setting, reference selection setting and modulation.

Note: If a good command is sent but the proper number of bytes are not also sent or read for the given command, unknown behavior may result. Recycling the WFNV power may be needed..