

Model Number : SM220

Synapse Part Number : SM220UF1

The SM220 series SNAP engines provide highly reliable networking applications. Customers who use this module in their products often have a need to reprogram the modules with a specific SNAP OS version or application script, and an efficient method of doing so at the module level would be of great benefit. The software and hardware presented in this document are intended to provide users with a starting point for creating their own programming solutions, and shouldn't be considered a "finished product."

Core Upgrading or Downgrading Methods

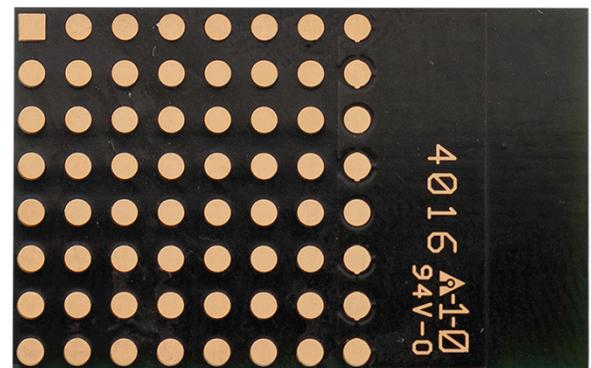
Reprogramming the SM220 may be done over-the-air or serially. An efficient way to reprogram SM220 modules is presented here as an example, and involves using multiple serial ports for simultaneous programming. This document describes a process and methodology that can be applied to any SNAP module for any SNAP module programming task, from updating application scripts to updating the module OS.

Hardware

The SM220 module is constructed as a surface-mount module, and the pin-outs are represented as round pads as shown in the image to the right.

This table shows the pin arrangement of the SM220 module.

A1	A2	A3	A4	A5	A6	A7	A8
B1	B2	B3	B4	B5	B6	B7	B8
C1	C2	C3	C4	C5	C6	C7	C8
D1	D2	D3	D4	D5	D6	D7	D8
E1	E2	E3	E4	E5	E6	E7	E8
F1	F2	F3	F4	F5	F6	F7	F8
G1	G2	G3	G4	G5	G6	G7	G8
H1	H2	H3	H4	H5	H6	H7	H8



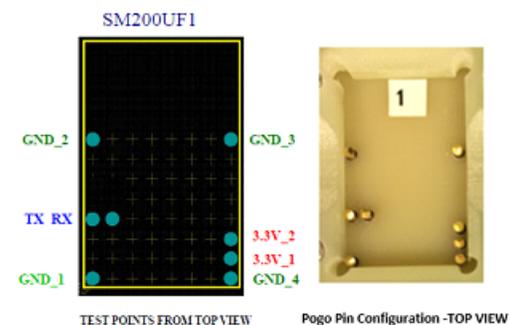
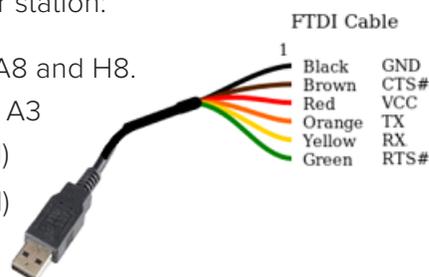
To upgrade the SM220 core, the following pads must make electrical contact with the multi-programmer station:

GROUND PADS : (4 available) A1, H1, A8 and H8.

3.3V POWER PADS : (2 available) A2 and A3

TX PAD : H4 (Assumes UART1)

RX PAD : G4 (Assumes UART1)



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SM220 Multi-Programming Station Block Diagram

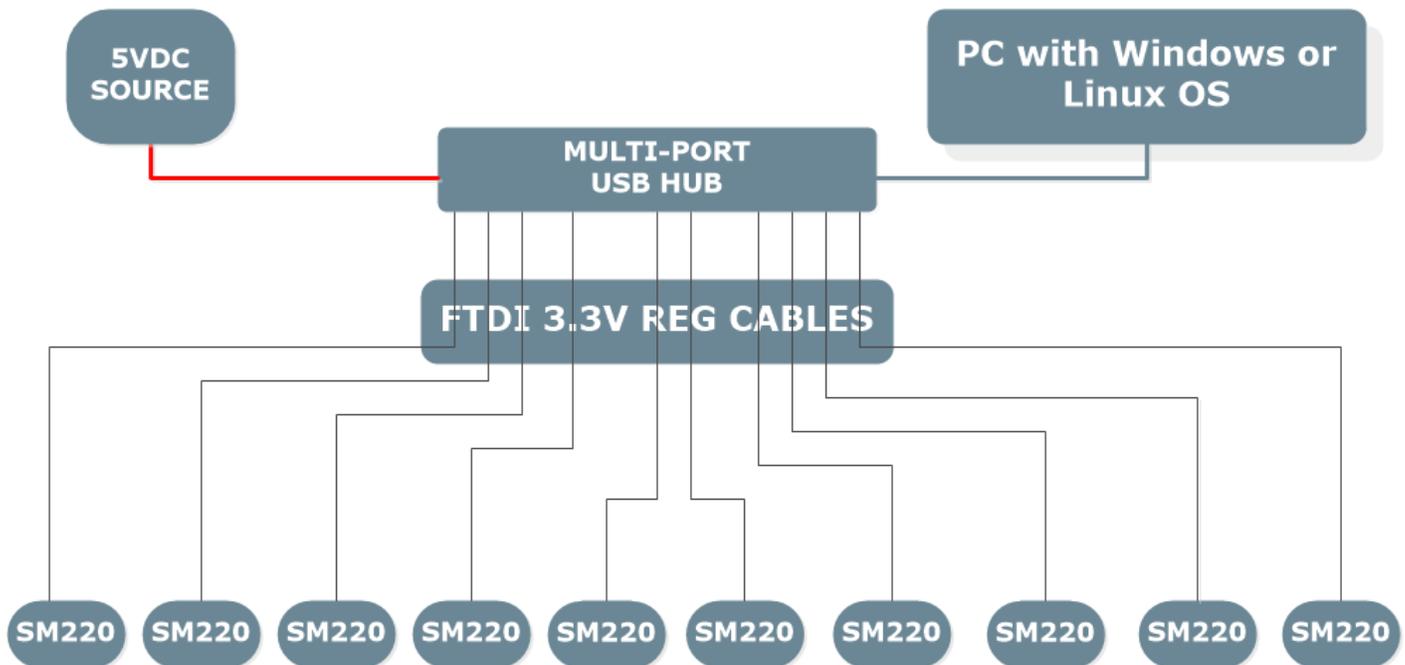


Photo 1
Example Programming Station

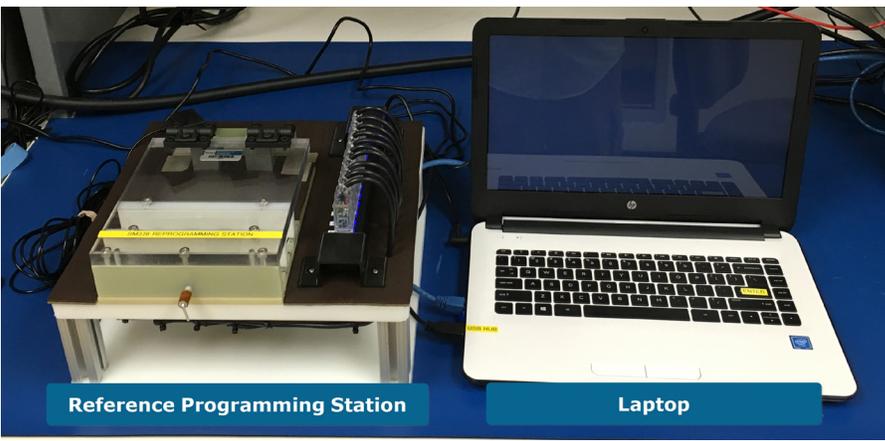


Photo 2
Loading SM220s into stations
Connection is made with Pogo
Pins below the module.

This example uses:
Ubuntu 16.04 (ubuntu.com)
Python 2.7 (python.org) and
SNAPconnect 3.5
(developer.synapse-wireless.com)

Reference Software Features

- SNAP OS programming.
- Snappy application programming.
- Simultaneous reprogramming of all 10 positions via serial interfaces
- Verification of programming
- Can program 10 SM220 modules with the SNAP OS in about 46 seconds.
- Reference software is available at: <https://github.com/synapse-wireless/bulk-reprogramming>
- Reference hardware can be obtained from:
 - Sabrent 13 Port High Speed USB 2.0 Hub with Power Adapter And 2 Control Switches (HB-U14P)
https://www.amazon.com/Sabrent-Adapter-Control-Switches-HB-U14P/dp/B00HL7Z46K/ref=sr_1_2?ie=UTF8&qid=1481213852&sr=8-2&keywords=13+ports+usb+hub
 - FTDI Cable: FTDI to TTL, TTL-232RG-VREG3V3-WE
<http://www.digikey.com/product-search/en?keywords=TTL-232RG-VREG3V3-WE>

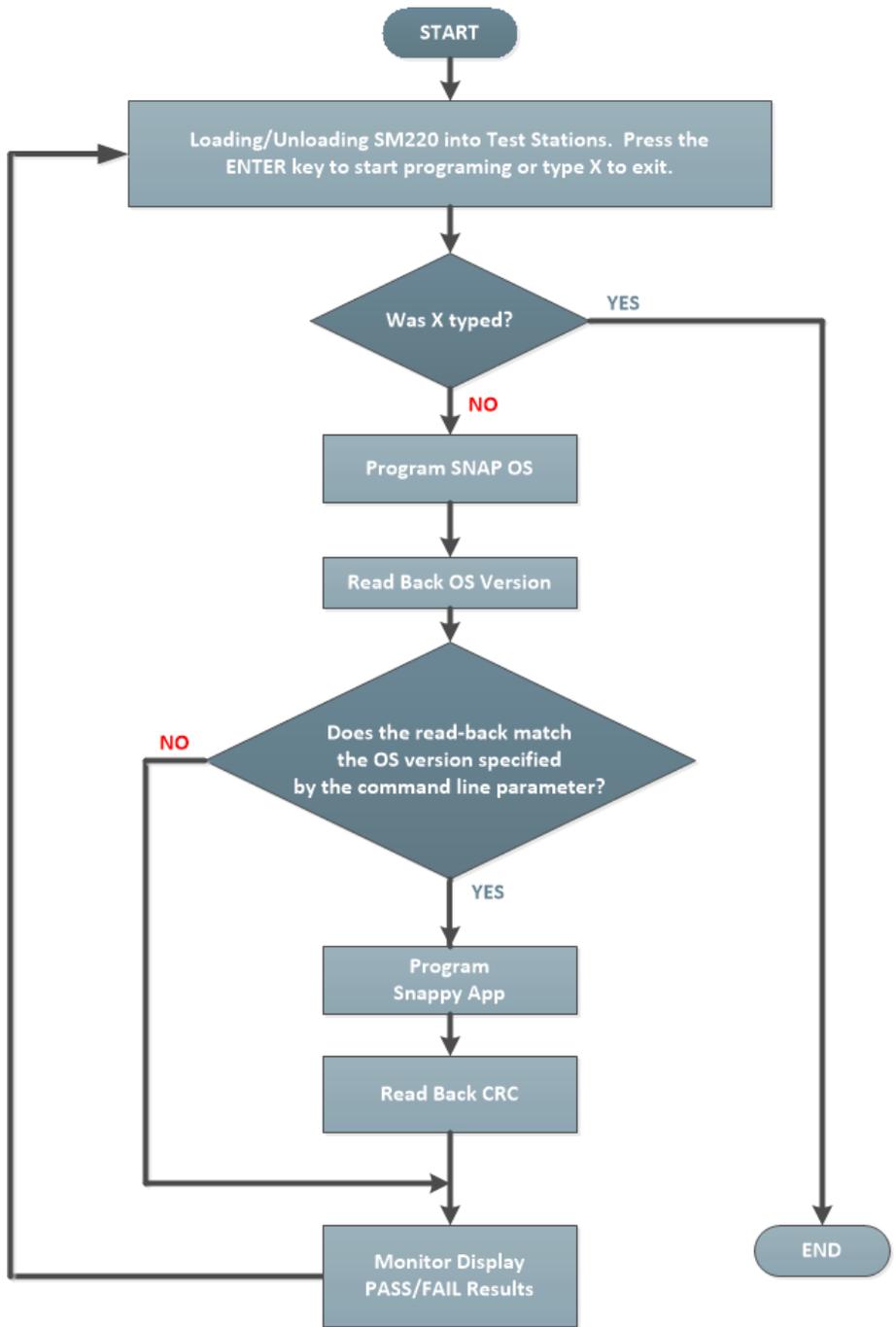
Software/Hardware Limitations

The radios must already be programmed with the correct Synapse bootloader. Radios without bootloaders cannot be programmed. Radios with outdated bootloaders cannot be updated. This task requires a fixture equipped with a JTAG programmer and software which handles that. Software configuration (which SNAP OS file or Snappy script file to program) is performed through the following command line parameters:

Command Line Parameter	Description
<code>--os_file filename</code>	Optional. It specifies the SNAP OS file to be programmed. If not specified, you can perform Snappy script upload only.
<code>--os_version os_version</code>	Optional. If specified, the programming software will verify (read back) the SNAP OS version after programming it. Example: <code>--os_version 2.5.6</code> The OS version is read from the radios by calling RPCs: <code>getInfo(5)</code> , <code>getInfo(6)</code> , and <code>getInfo(7)</code> .
<code>--spy_file filename</code>	Optional. It specifies the Snappy application package file to be programmed. If not specified, you can perform SNAP OS programming only.
<code>--crc crc</code>	Optional. If specified, the programming software will read back the crc (NV40) and compare it with the crc specified by the command line parameter, after programming the Snappy application (from the spy file). If the <code>--spy_file</code> parameter is not specified then the <code>--crc</code> parameter will be ignored.

Software User Interface and Test Flow Chart

There is no GUI, the software is a command line application.



Work Area

The unassembled product is susceptible to static discharge. Make sure to handle in a static safe area. Observe all ESD precautions.