Report Title: ***G****enerating Digitally Modulated Signals on the SMW, Remotely Using LabVIEW.*
By: Shayma Alteneiji
Description: *An already programmed LabVIEW project controlling the FSW and SMW was modified to remotely generate digitally modulated signals on the SMW. Moreover, using time division multiplexing (TDM), 12 signals of various center frequencies in the range of 1525 MHz – 1559 MHz (channels) were generated on the SMW and transmitted to the FSW each at a time, for a particular channel slot period. The signal received was then demodulated on the FSW.*
Objective: - *To remotely generate digitally modulated signals on the SMW using LabVIEW.* - *Using TDM to simulate detecting the 12 channels' signals on the FSW.*

1. LabVIEW block diagram.

Figure 1 shows the full program block diagram, and figure 2 shows program front panel is shown in figure 2.

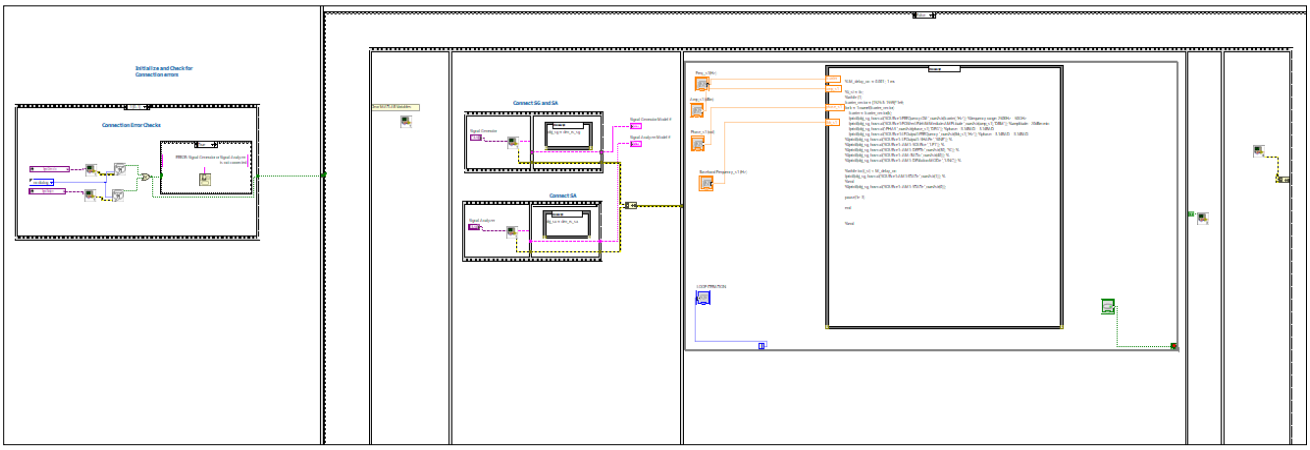

Figure 1. LabVIEW block diagram

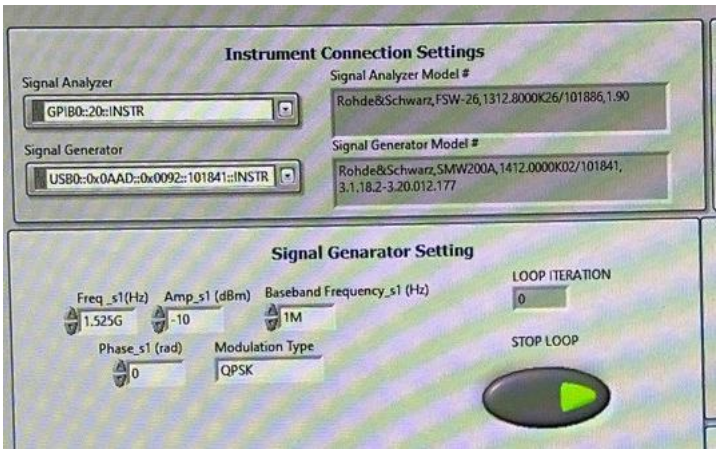

Figure 1. LabVIEW front panel.

The modified matlab code is given below. The code generates a **QSPK** modulated signal with a symbol rate of **100 ksym/s**. The codeing is **off** and the filter used is **root raised cosine** with a roll off factor of **0.25.** The data source is the pattern **1001**.

```
fprintf(obj_sg,horzcat(':OUTP:STAT ON'));
fcarrier_vector = [1525: 3: 1559]*1e6;
for k = 1:numel(fcarrier_vector
    fcarrier = fcarrier_vector(k);

    fprintf(obj_sg, harzcat('SOURce1:FREQuency:CW ',num2str(fcarrier), 'Hz'));
    fprintf(obj_sg, harzcat('SOURce1:POWer:LEVel:IMMediate:AMPLitude ',num2str(amp_s1), 'DBM'));
    fprintf(obj_sg, harzcat(':PHAS ',num2str(phase_s1), 'DEG'));
    fprintf(obj_sg, harzcat('SOURce1:BB:DM:CODing ','OFF'));
    fprintf(obj_sg, harzcat('SOURce1:BB:DM:FORMat ',Modulation));
    fprintf(obj_sg, harzcat('SOURce1:BB:DM:SRATe ',num2str(100),'kHz'));
    fprintf(obj_sg, harzcat('SOURce1:BB:DM:FILTer:TYPE ','RCOSine'));
    fprintf(obj_sg, harzcat('SOURce1:BB:DM:FILTer:PARameter:RCOSine ',num2str(0.25)));
    fprintf(obj_sg, harzcat('SOURce1:BB:DM:STATe ON'));
pause(1)
end
```

2. Results

The RF signal center frequency varied in steps of 3 MHz on the SMW, as shown in the attached video. The smaller the channel time slot (the faster the multiplexing), the more the channels' signals appeared as if they were measured simultaneously. In VSA and IQ analysis modes, the center frequency was set to 1.525 GHz, and the other parameters were configured as previously set on the SMW. Only when the SMW transmitted a signal with a center frequency of 1.525 GHz did the VSA and IQ analysis show the expected results. The results are depicted in the attached videos

3. Future Steps

The future step is to work on configuring the IQ analysis and the VSA modes of the FSW remotely to demodulate the signals received from all detected channels.