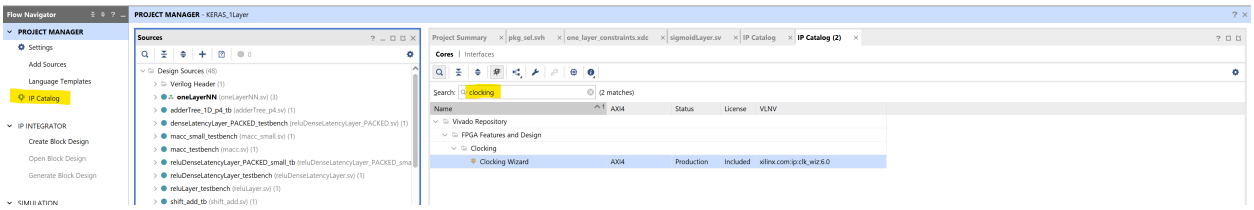
# Generate IP used in One-Layer Model

Oleh Kondratyuk June $13^{th}$, 2022

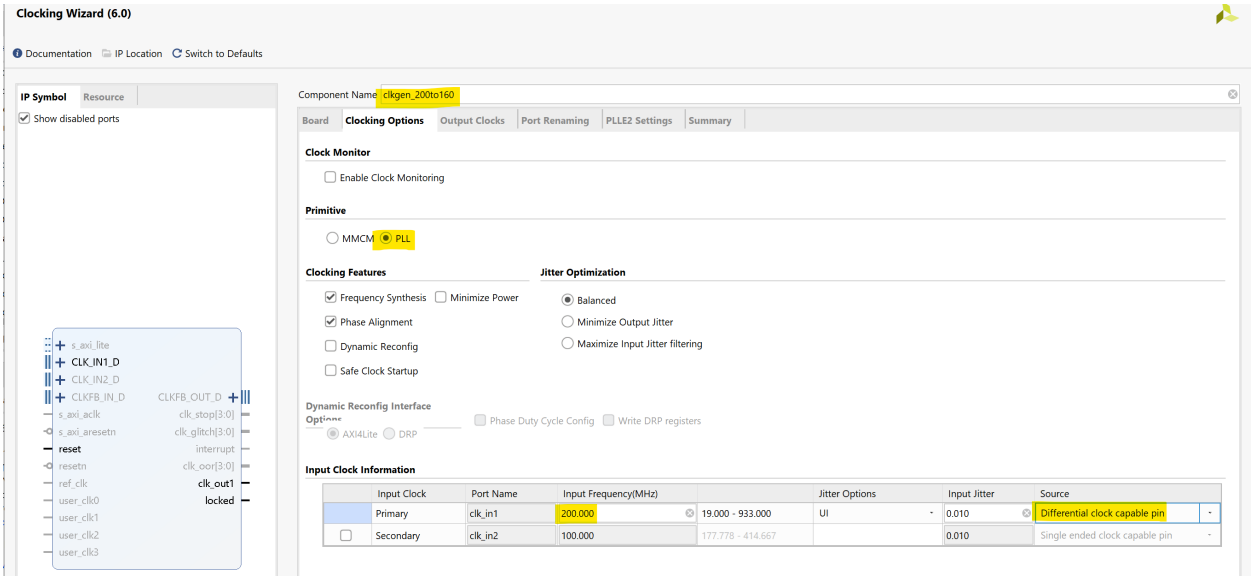
## 1 Clocking Wizard

As of the time of writing, the one-layer model takes a differential clock input using a `clkreset` module and a Vivado clocking wizard IP. This is the configuration that was used to collect onelayer data:

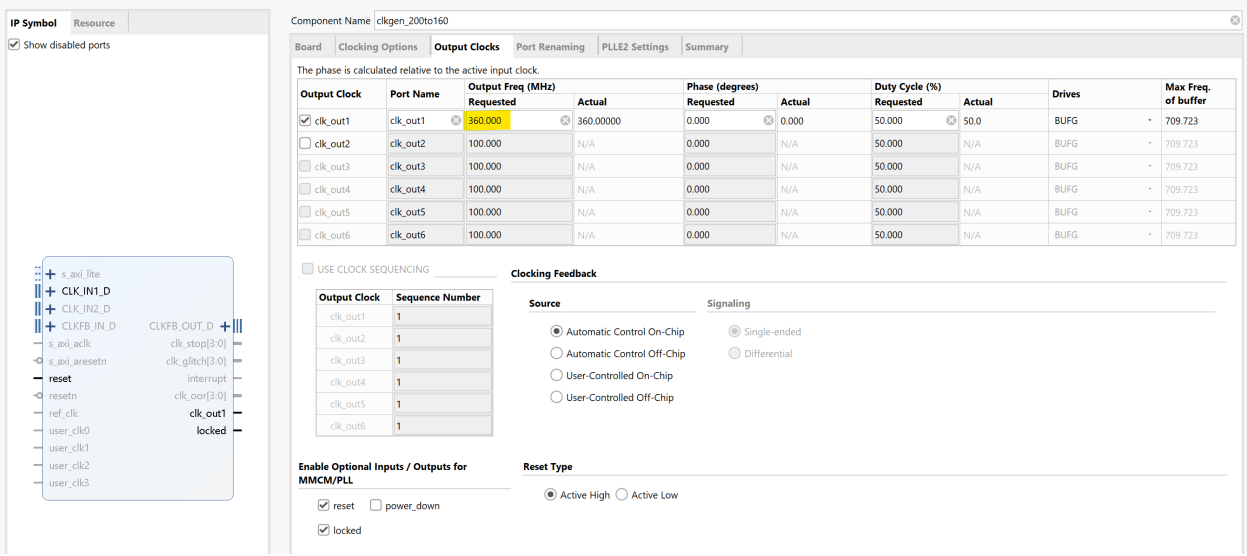
### 1.1 Open Vivado IP Catalog




### 1.2 Customization

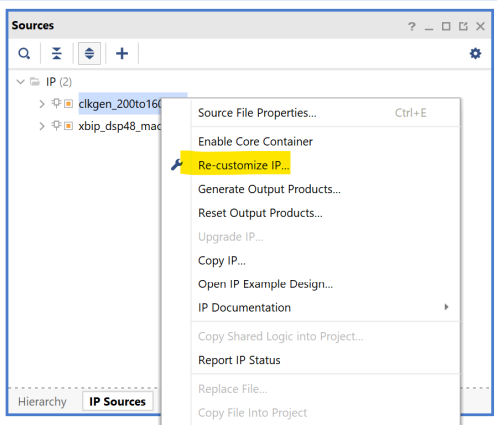



- Change the Component Name to `clkgen_200to160` (the name is just a name, we will not be fixed to converting 200 MHz to 160 MHz)
- Select `PLL` radio button
- Set input frequency to 200 MHz
- Select `Differential clock capable pin` from the drop-down menu
- Leave everything else at defaults




Under the `Output Clocks` tab, change the output clock frequency to the desired frequency (you may have to customize the existing IP as your desired frequency changes). Leave everything else at defaults and press "OK" on the bottom left of the Customization window and generate the IP.

## 1.3 Recustomizing IP

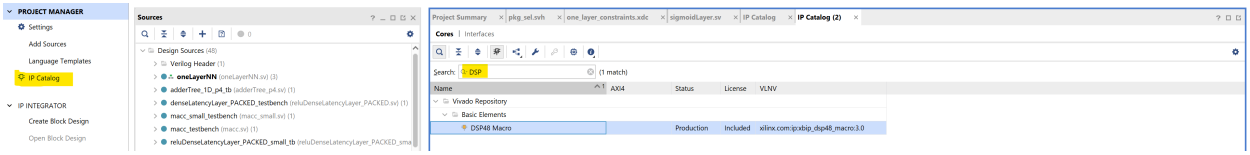



To recustomize existing IP, go to `IP Sources` tab in the Sources window and right-click on the IP block you want to recustomize. Select the highlighted option and the customization window will pop up with your current settings. Recustomized IP blocks will have to be regenerated.

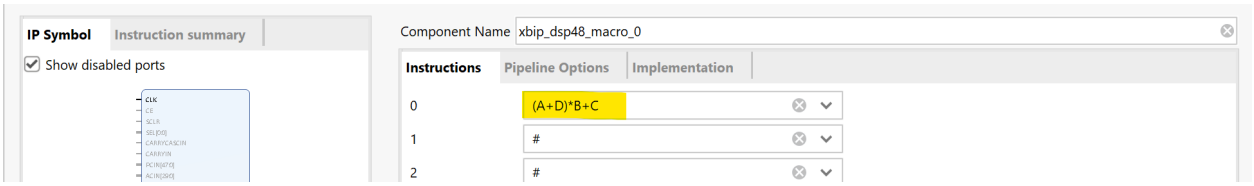
# 2 DSP Macro

As of the time of writing, the one-layer model uses a DSP macro to perform explicit multiplier packing for low bitwidth configurations (if enabled). This is the IP configuration that was used:

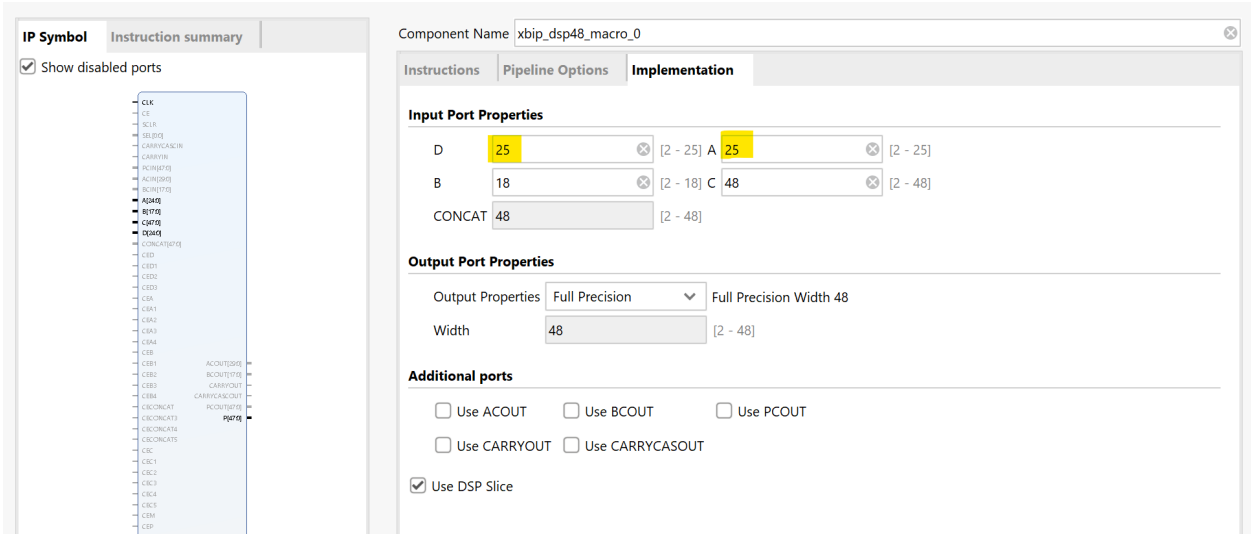
## 2.1 Open IP Catlog




## 2.2 Customization




Set the instruction configuration to $\boxed{(A + D) * B + C}$ and leave the rest blank.




Increase the input port properties to the maximum and leave all other options at defaults. Press "OK" and generate the IP.

## 2.3 Recustomizing IP

Exactly the same process as resustomizing the clocking wizard, see "Recustomizing IP" section under "Clocking Wizard".