openocd -- 目前在ubuntu 16.04系统上测试成功

1. feature

- 目前在FPGA上已经测出来，已能支持32个tap
- autotap 推定可以到16个，再多的话，需要把工具自己推出来的写成定义tap

2. openocd使用

```
jtag_rest 1 0                -- 复位tck和TMS组合而成，如果有trstn的话，则产生trstn
irscan zynq.dap 0x5          -- 往tap寄存器写IR指令为0x5,   TAP在target.cfg文件中进行定义jtag newtap
drscan zynq.dap 16 0x4321    -- 向指定TAP输入DR数据，长度为16，数据为0x4321
```

- 注意，一定要先指定TAP IR, 然后才可以向 DR进行输入数据，不然openocd会报错退出。
- openocd使用tcl语法进行配置，可以使用telnet进行连接

3. config file

3.1 ft2232h.cfg

<file tcl ft2232h.cfg> ##

Layout: FTDI FT2232H example

ADBUS0 TCK

ADBUS1 TDI

ADBUS2 TDO (input)

ADBUS3 TMS

ADBUS4 nTRST

ADBUS5 nSRST

ADBUS6 OE (active high) for TRST, TDI, TMS, TCK

ADBUS7 DBGREQ_L

interface ftdi ftdi_vid_pid 0x0403 0x6010 ftdi_channel 0

3.1.0.0.0.1 interface config 0

just TCK TDI TDO TMS

ftdi_layout_init 0x0008 0x000b

3.1.0.0.0.2 interface config 1

ADBUS6 no used

ftdi_layout_init 0x0098 0x00bb; # initial data, port direction (1-out, 0-in) ftdi_layout_signal nTRST -data 0x0010 -input 0x0010 ftdi_layout_signal nSRST -data 0x0020 -input 0x0020 ftdi_layout_signal DBGREQ_L -data 0x0080 -input 0x0080

-data can drive to 1 & 0

-oe can only drive to 0 / high-z, can't drive 1

-input can use cmd ftdi_get_signal to get signal value

</file>

3.2 target.cfg

<file tcl target.cfg> set _CHIPNAME zynq jtag newtap $_CHIPNAME dap -irlen 8 -ircapture 0x01 -irmask 0x03

adapter_khz 5000

gdb_port 3333

tcl_port 6666

telnet_port 4444

</file>

4. 启动服务

```
sudo openocd  -f ft2232h.cfg  -f target.cfg
```

5. RPC server

```
OpenOCD provides a simple RPC server that allows to run arbitrary Tcl
commands and
receive the results.
To access it, your application needs to connect to a configured TCP port
(see tcl_port).
Then it can pass any string to the interpreter terminating it with 0x1a and
wait for the
return value (it will be terminated with 0x1a as well). This can be repeated
as many times
as desired without reopening the connection.
Remember that most of the OpenOCD commands need to be prefixed with ocd_ to
get the
results back. Sometimes you might also need the capture command.
See contrib/rpc_examples/ for specific client implementations.
```

可以参考openocd包目录contrib/rpc_examples/下的例子。