CYPRESS®

EMBEDDED IN TOMORROW™

Description of ether examples

YOTS

9/14/2018

Agenda

→ Software tools required

→ MII 10/100Mbps example

→

→

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Software tools required

Installing software tools

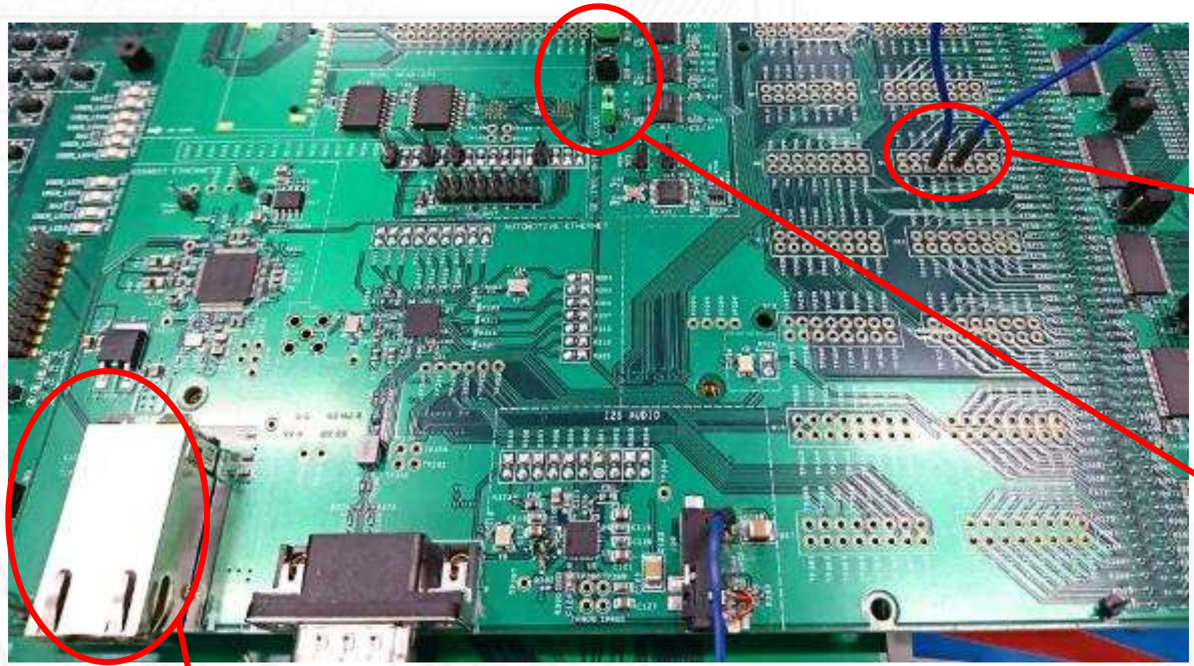
- Please install free software tools shown in below
  - Wireshark (https://www.wireshark.org/download.html)
  - python 2.7.X or 3.4+ (https://www.python.org/downloads/)
  - scapy (https://scapy.readthedocs.io/en/latest/installation.html)

MII/RGMII 100/1000Mbps example

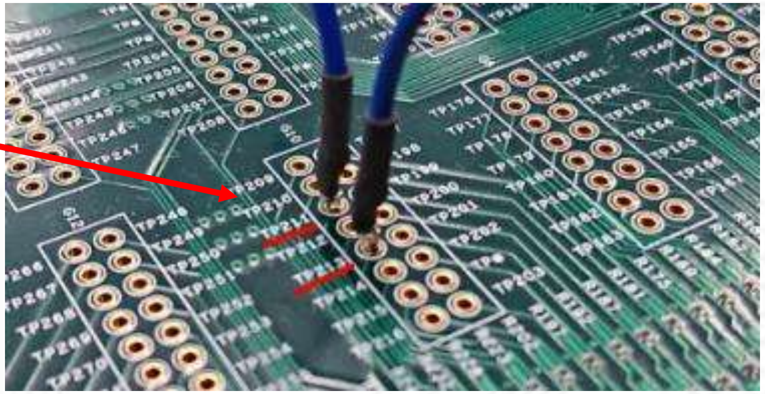
Description of this application

- This example transmits/receives ether frames.
- In this example, TVII transmit ether packet back if it received ether packet.
- You can check transmitting/receiving ether frames using your PC with free software “Python Scapy” and “Wireshark”.

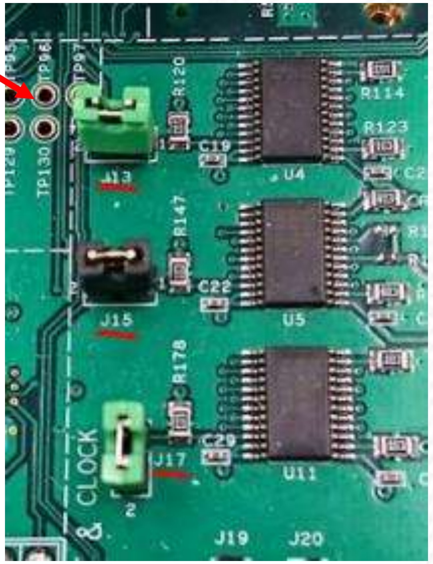
Set up hardware (PSVP adaptor board)



- Short TP211 and TP213



- Close JP13, JP15, JP17



- Connect the board to your PC with the twist pare cable.

Set up hardware (CYTVII-C-2D-500-BGA_CPU_BOARD)

- MII 100Mbps
  - Open R234 and R241
  - Close all related jumpers
- RGMII 1000Mbps
  - Open R234
  - Close all related jumpers

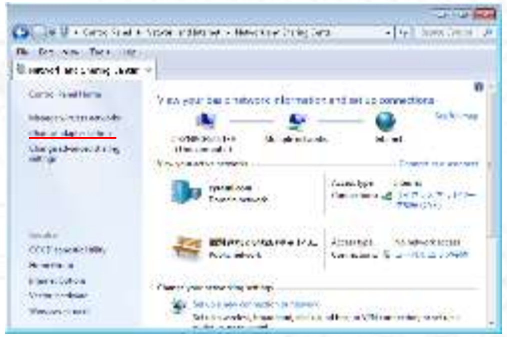
Set up hardware (CYTVII-C-2D-327-BGA_CPU_BOARD)

- MII 100Mbps
  - Open R234 and R241 and R235
  - Close all related jumpers
- RGMII 1000Mbps
  - Open R234 and R243
  - Close all related jumpers

Set up your PC

1. Open “Control Panel”->”Network and Internet”->”Network and Sharing Center” and click “Change adapter settings”

①

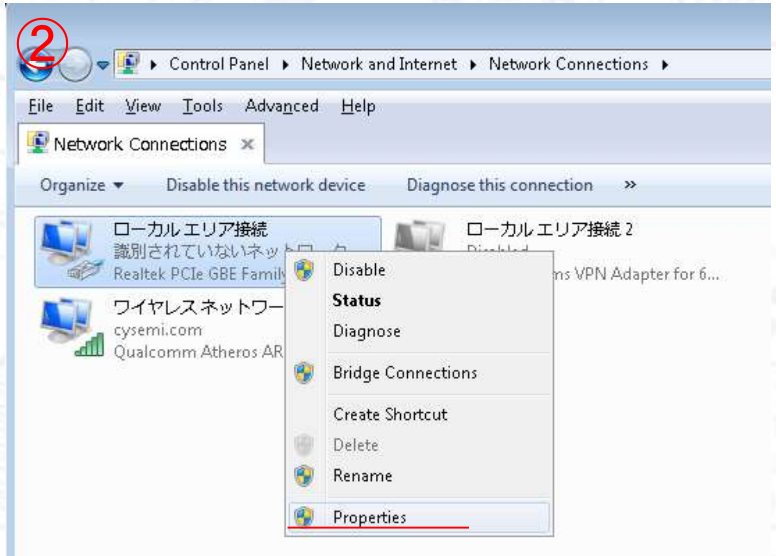


2. Right click on the LAN which is connected to the TVII board and click “Properties”

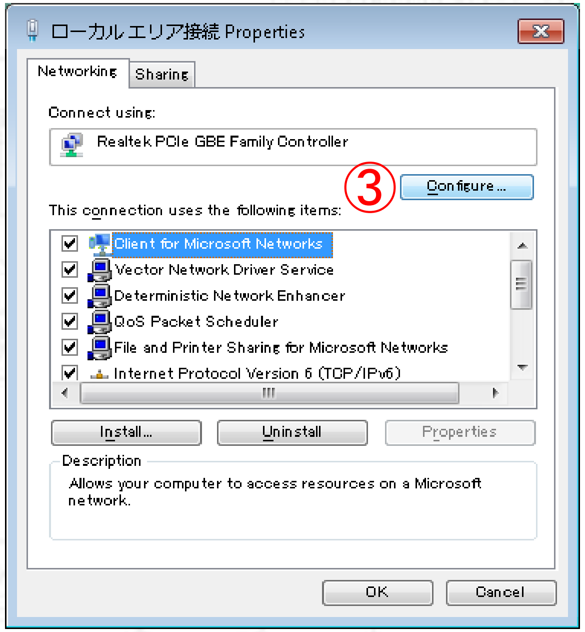
3. Click the “Configure” button **4.** Select “Advanced” tab **5.** Select “Speed and Duplex” in “Property” box

6. Select the speed you want (See next slide)

②

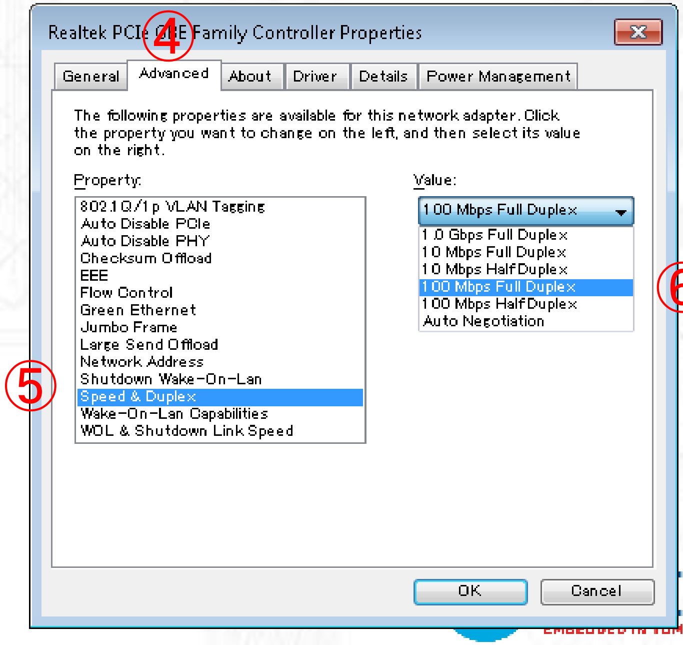


③


ローカルエリア接続 Properties
Networking
Sharing
Connect using:
Realtek PCIe GBE Family Controller
Configure...
This connection uses the following items:
☑ Client for Microsoft Networks
☑ Vector Network Driver Service
☑ Deterministic Network Enhancer
☑ QoS Packet Scheduler
☑ File and Printer Sharing for Microsoft Networks
☑ Internet Protocol Version 6 (TCP/IPv6)
Install...
Uninstall
Properties
Description
OK
Cancel

Allows your computer to access resources on a Microsoft network.

④ ⑤ ⑥



The following properties are available for this network adapter. Click the property you want to change on the left, and then select its value on the right.

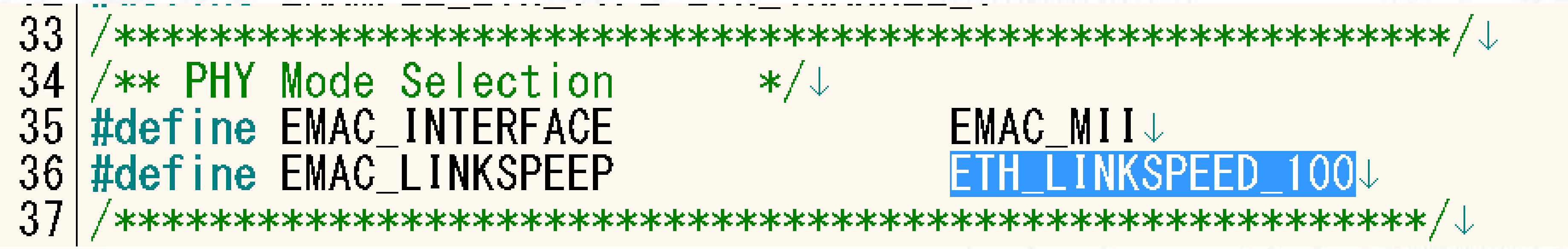
Property: Speed & Duplex — Value: 100 Mbps Full Duplex

Set up your PC

- MII 100Mbps
  - Select “100 Mbps Full duplex”
- RGMII 1000Mbps
  - Select “Auto Negotiation”

Modify the example and execute it

- Set the preprocessor macro “EMAC_INTERFACE” “EMAC_MII”
- Set the preprocessor macro “EMAC_LINKSPEEP” in the C code so that the speed becomes as you like. (e.g. If you want to try 100Mbps, define “EMAC_LINKSPEEP” as “ETH_LINKSPEED_100”)
- If, you use “EMAC_MII” and “ETH_LINKSPEED_100” and if you use PC, you have to disable auto MDI/MDI-X negotiation of the PHY.

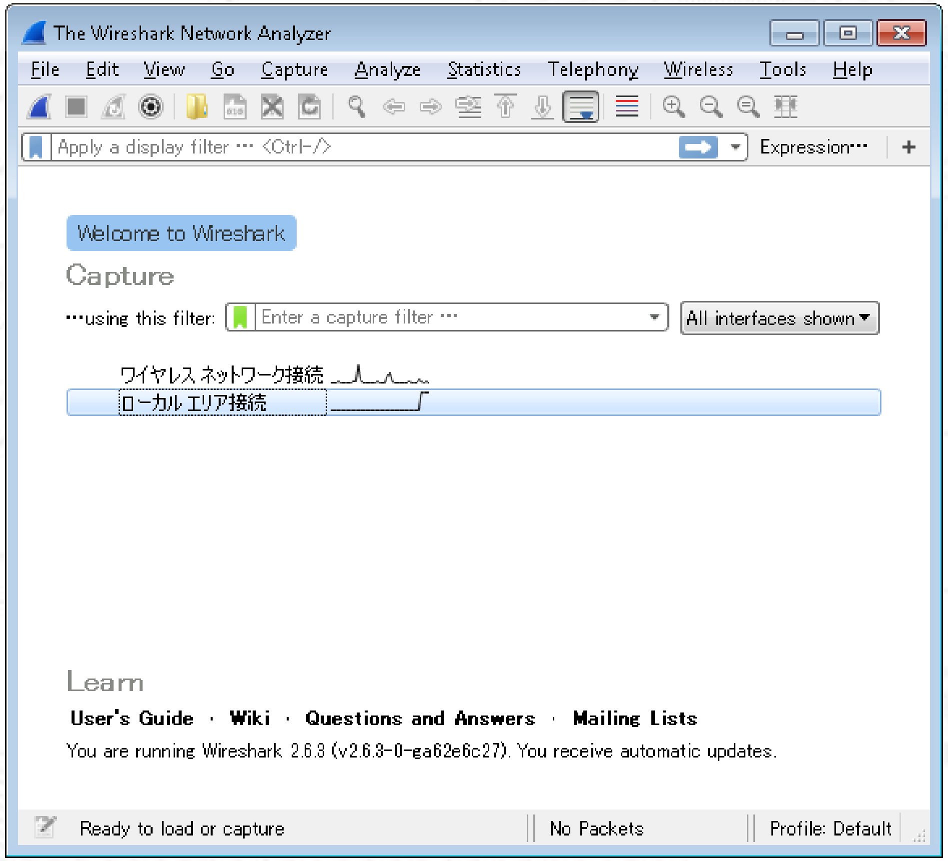


```
/********************************************************/↓
/** PHY Mode Selection      */↓
#define EMAC_INTERFACE              EMAC_MII↓
#define EMAC_LINKSPEEP              ETH_LINKSPEED_100↓
/*******************************************************/↓
```

- If you use “MII 100Mbps” with windows PC, search word “YOTS” in the code and uncomment the line to disable auto negotiation.
- Build your project and execute it.

Launch the “Wireshark”

1. Launch the “Wireshark” and select the LAN and make sure that the wireshark started capturing
2. Set the filter as “eth.src == 2.0.0.0.0.2 or eth.src == 4.0.0.0.0.4”



Apply a display filter … <Ctrl-/>

Welcome to Wireshark

Capture

…using this filter: Enter a capture filter … All interfaces shown

ワイヤレス ネットワーク接続

ローカル エリア接続

Learn

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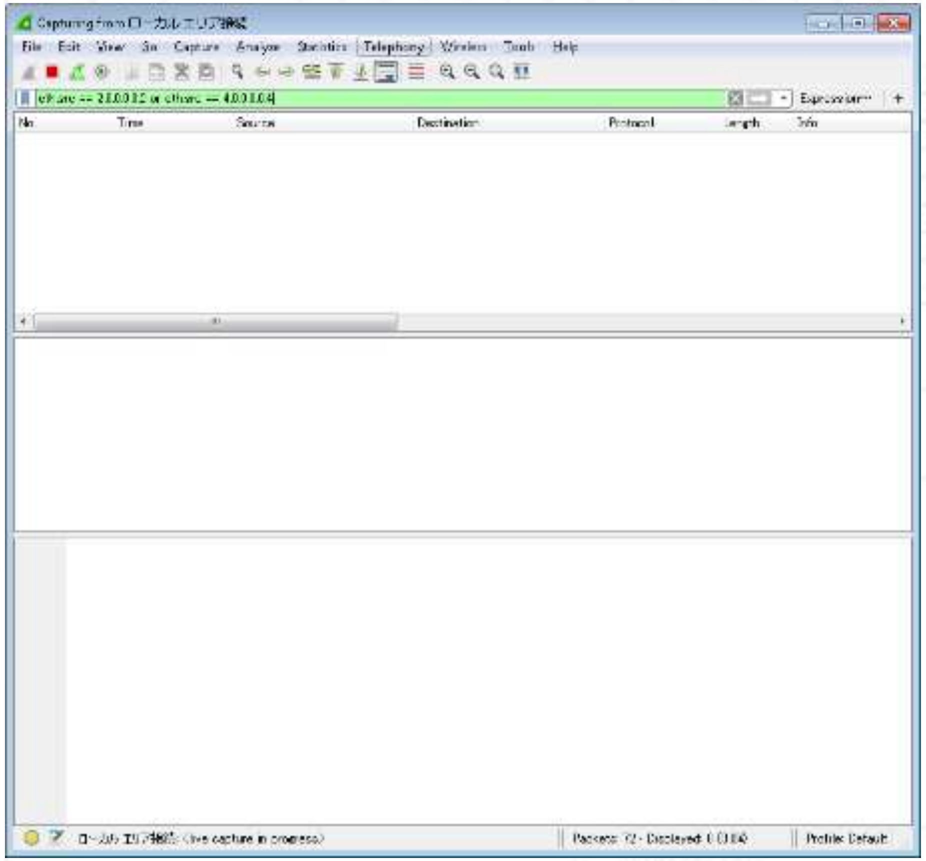
You are running Wireshark 2.6.3 (v2.6.3-0-ga62e6c27). You receive automatic updates.

Ready to load or capture | No Packets | Profile: Default

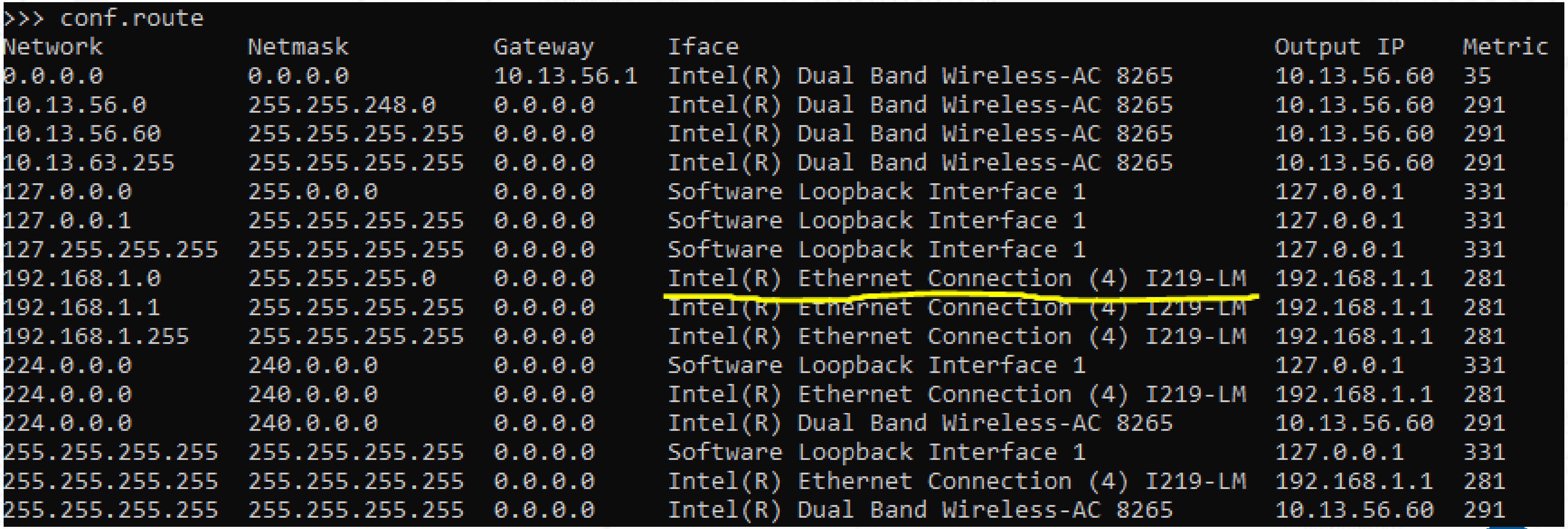


eth.src == 2.0.0.0.0.2 or eth.src == 4.0.0.0.0.4

ローカル エリア接続: <live capture in progress> | Packets: 72 · Displayed: 0 (0.0%) | Profile: Default

Python scapy (find ether interface)

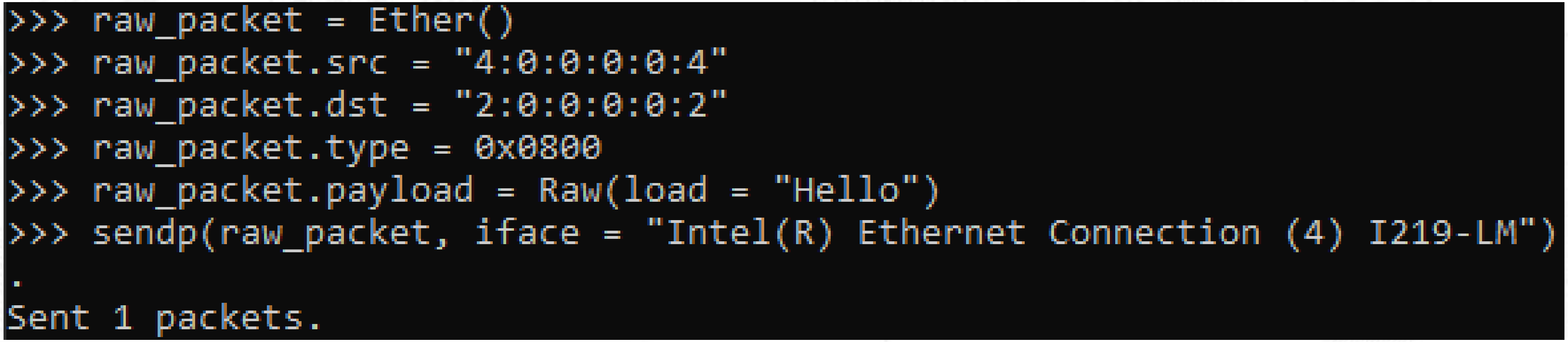
- launch command prompt.
- type “scapy”
- type conf.route and find your ether interface connected to the TVII



```
>>> conf.route
Network          Netmask          Gateway     Iface                                     Output IP    Metric
0.0.0.0          0.0.0.0          10.13.56.1  Intel(R) Dual Band Wireless-AC 8265       10.13.56.60  35
10.13.56.0       255.255.248.0    0.0.0.0     Intel(R) Dual Band Wireless-AC 8265       10.13.56.60  291
10.13.56.60      255.255.255.255  0.0.0.0     Intel(R) Dual Band Wireless-AC 8265       10.13.56.60  291
10.13.63.255     255.255.255.255  0.0.0.0     Intel(R) Dual Band Wireless-AC 8265       10.13.56.60  291
127.0.0.0        255.0.0.0        0.0.0.0     Software Loopback Interface 1             127.0.0.1    331
127.0.0.1        255.255.255.255  0.0.0.0     Software Loopback Interface 1             127.0.0.1    331
127.255.255.255  255.255.255.255  0.0.0.0     Software Loopback Interface 1             127.0.0.1    331
192.168.1.0      255.255.255.0    0.0.0.0     Intel(R) Ethernet Connection (4) I219-LM  192.168.1.1  281
192.168.1.1      255.255.255.255  0.0.0.0     Intel(R) Ethernet Connection (4) I219-LM  192.168.1.1  281
192.168.1.255    255.255.255.255  0.0.0.0     Intel(R) Ethernet Connection (4) I219-LM  192.168.1.1  281
224.0.0.0        240.0.0.0        0.0.0.0     Software Loopback Interface 1             127.0.0.1    331
224.0.0.0        240.0.0.0        0.0.0.0     Intel(R) Ethernet Connection (4) I219-LM  192.168.1.1  281
224.0.0.0        240.0.0.0        0.0.0.0     Intel(R) Dual Band Wireless-AC 8265       10.13.56.60  291
255.255.255.255  255.255.255.255  0.0.0.0     Software Loopback Interface 1             127.0.0.1    331
255.255.255.255  255.255.255.255  0.0.0.0     Intel(R) Ethernet Connection (4) I219-LM  192.168.1.1  281
255.255.255.255  255.255.255.255  0.0.0.0     Intel(R) Dual Band Wireless-AC 8265       10.13.56.60  291
```

Python scapy (Sending raw packet)

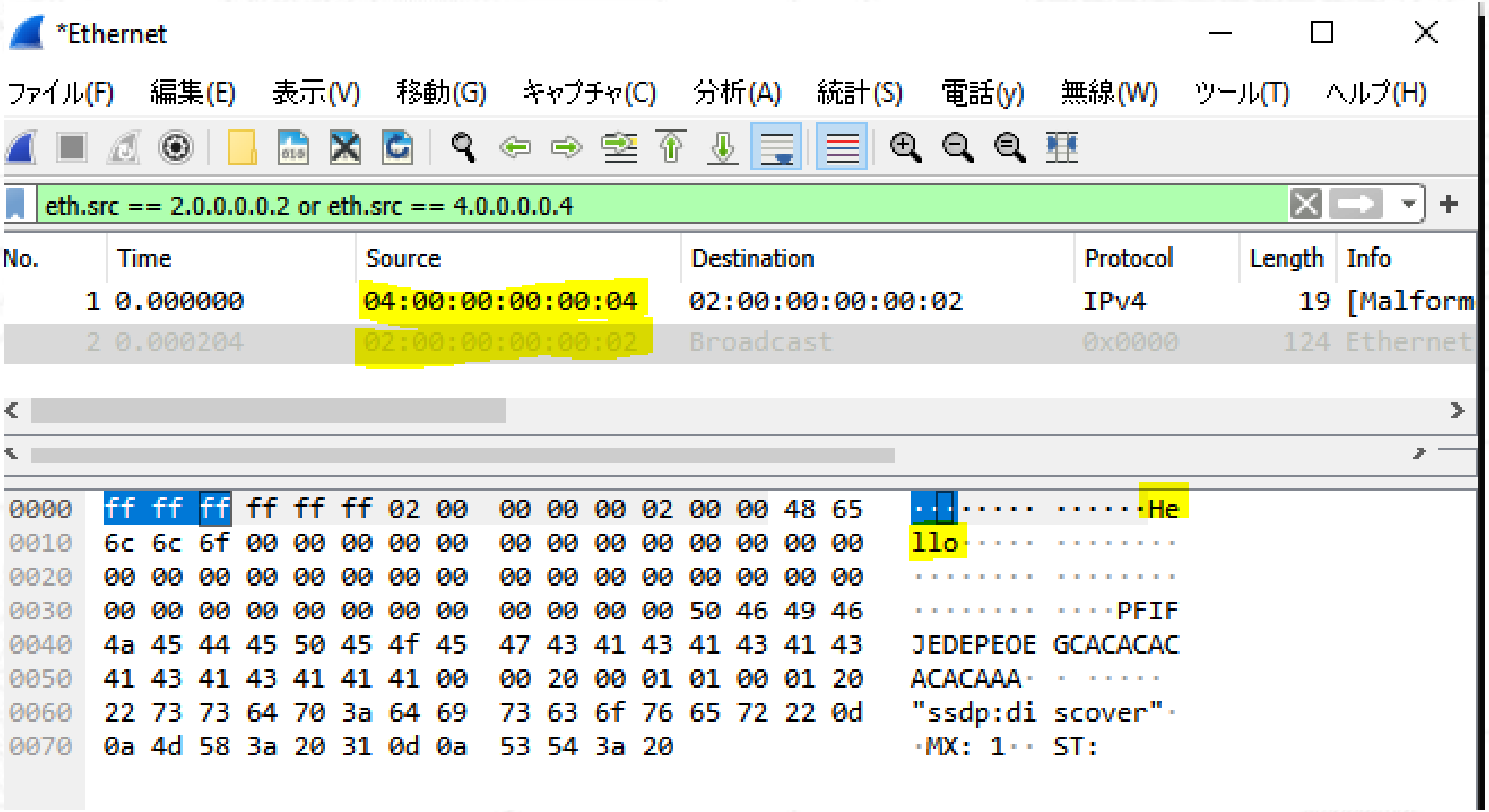
- create a raw ether packet instance. (>>> raw_packet = Ether())
- set source MAC address (>>> raw_packet.src = “2:0:0:0:0:2”)
- set destination MAC address (>>> raw_packet.dst = “4:0:0:0:0:4”)
- set type (>>> raw_packet.type = 0x0800)
- set payload (>>> raw_packet.payload = Raw(load = “Hello”)
- Send the packet (>>> sendp(raw_packet, iface = “<your inaterface name>”)



```
>>> raw_packet = Ether()
>>> raw_packet.src = "4:0:0:0:0:4"
>>> raw_packet.dst = "2:0:0:0:0:2"
>>> raw_packet.type = 0x0800
>>> raw_packet.payload = Raw(load = "Hello")
>>> sendp(raw_packet, iface = "Intel(R) Ethernet Connection (4) I219-LM")
.
Sent 1 packets.
```

Make sure transmitting/receiving frame

1. Your PC transmits the frame, destination address of which is “04:00:00:00:00:04”
2. Your PC receives the frame, destination address of which is “02:00:00:00:00:02”



eth.src == 2.0.0.0.2 or eth.src == 4.0.0.0.4

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	04:00:00:00:00:04	02:00:00:00:00:02	IPv4	19	[Malform
2	0.000204	02:00:00:00:00:02	Broadcast	0x0000	124	Ethernet

```
0000  ff ff ff ff ff ff 02 00  00 00 00 02 00 00 48 65   ········ ······He
0010  6c 6c 6f 00 00 00 00 00  00 00 00 00 00 00 00 00   llo····· ········
0020  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········ ········
0030  00 00 00 00 00 00 00 00  00 00 00 00 50 46 49 46   ········ ····PFIF
0040  4a 45 44 45 50 45 4f 45  47 43 41 43 41 43 41 43   JEDEPEOE GCACACAC
0050  41 43 41 43 41 41 41 00  00 20 00 01 01 00 01 20   ACACAAA· · ·····
0060  22 73 73 64 70 3a 64 69  73 63 6f 76 65 72 22 0d   "ssdp:di scover"·
0070  0a 4d 58 3a 20 31 0d 0a  53 54 3a 20               ·MX: 1·· ST:
```