

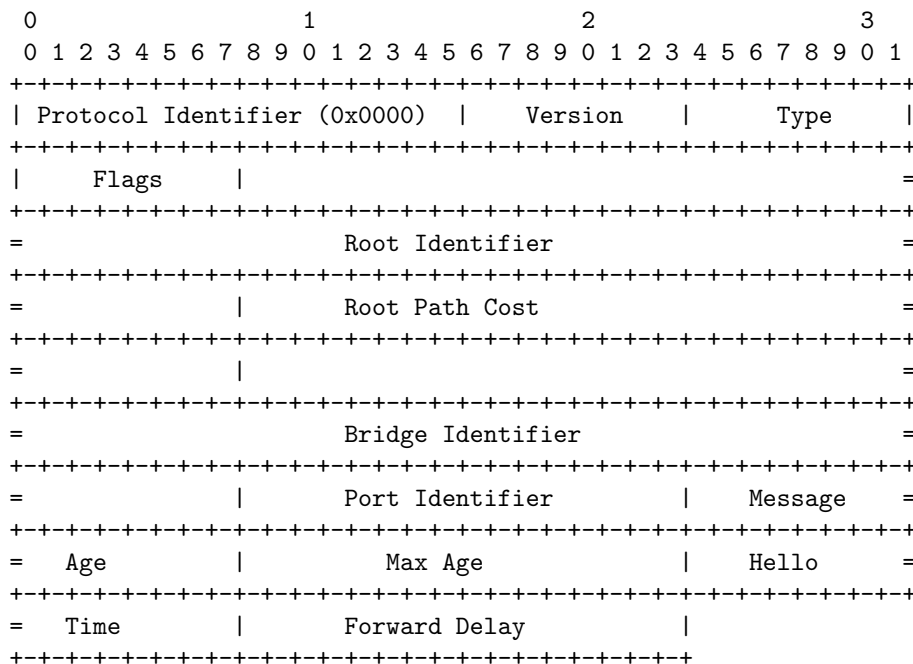
Problem Sheet #1

Problem 1.1: capturing bridge pdu (6+1+1+1+1 = 10 points)

Write a program that captures Bridge Protocol Data Units (BPDUs), decodes them and writes for each decoded packet a summary of the content of the packet to the standard output. Your program should use the `libpcap` library to receive packets and it must support reading packets from a `pcap` capture file. Make sure your program deals properly with truncated packets or otherwise malformed packets. A sample execution of your program may look like this:

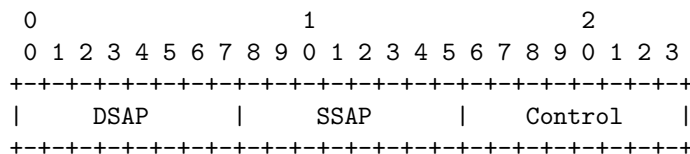
```
$ ./bpduspy /tmp/802.1w_rapid_STP.cap | head -1 | fold -s -w 72
frame.number=1 frame.time=1218369035.352170s frame.cap_len=60
frame.len=60 eth.dst=01:80:c2:00:00:00 eth.src=00:19:06:ea:b8:8c
eth.len=39 llc.dsap=0x42 llc.ssap=0x42 llc.ctrl=0x03
stp.identifier=0x0000 stp.version=0x02 stp.type=0x02
stp.root=80:01:00:19:06:EA:B8:80 stp.root.cost=0
stp.bridge=80:01:00:19:06:EA:B8:80 stp.port=32780 stp.msg_age=0
stp.max_age=5120 stp.hello=512 stp.forward=3840
```

A Spanning Tree Protocol (STP) (Version = 0x00) BPDUs has the following format:

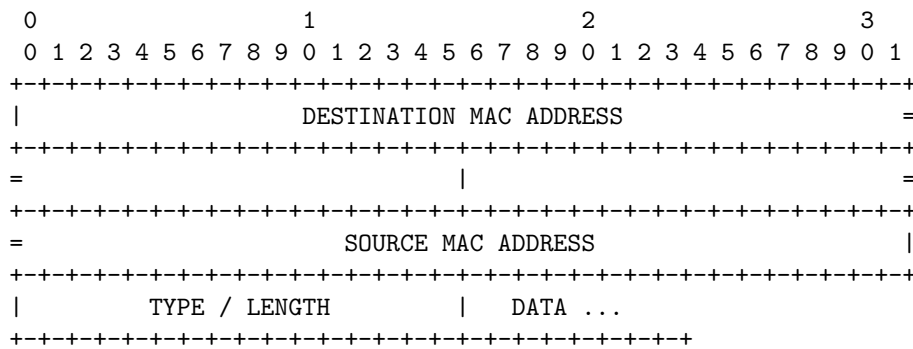


The Rapid Spanning Tree protocol (Version = 0x02) has an additional 8-bit version field at the end.

BPDUs are carried in Logical Link Control (LLC) protocol data units, which are carried in an Ethernet frame. The LLC header has the following structure:



An Ethernet frame has the following format:



Also answer the following questions (you may write the answers into comments contained in your source code):

- a) What kind of destination address is used by the Ethernet frame carrying BPDUs?
- b) Does an Ethernet frame carrying BPDUs contain a type code or a length value in the type/length field?
- c) Does an Ethernet frame carrying BPDUs contain padding octets?
- d) What are the Destination Service Access Point (DSAP) and the Source Service Access Point (SSAP) values of BPDUs?

Solution:

- a) BPDUs are sent to the special multicast address 01:80:c2:00:00:00 used by bridges.
- b) The BPDU type/length field carries a length value since its value is below 1500.
- c) The Ethernet frame contains padding octets to ensure it is of the minimum required size.
- d) The DSAP and SSAP values for the spanning tree protocol are 0x42.