Network training

Maël Auzias

Fall 2014

Contents

1   Introduction

1.1   Classification

Give a concrete example of each of the following kinds of networks (name some devices):

1. BAN,

2. PAN,

3. LAN,

4. WAN.

1.2   Topologies

Give a concrete example of each of the following network topologies:

1. Bus,

2. Star,

3. Fully connected.

1.3   TCP connection

According to TCP (RFC761 (January 1980)) , what are the sequences used in order to establish a connection between two hosts?

1.4   TCP or UDP?

1.4.1   Sensors

You are creating a network application using sensors. The sensors can receive requests to change their settings (rate of measurement, range...) and they continuously send their measurements.

1. Should request packets (settings) be sent with UDP or TCP? Why?

2. Should measurement packets be sent with UDP or TCP? Why?

1.4.2   Website

Does HTTP (RFC2616 (June 1999)) rely on TCP or UDP? Why?

1.5   FTP

1.5.1   Is FTP secure?

According to the file ftp-connect.pcap is FTP secure? What could you do to use it more securely?

1.5.2   FTP and TCP

According to the file ftp-disconnect.pcap does FTP respect the TCP protocol to close a connection?

1.6 DNS

1.6.1 Some news

According to the file nslookup.pcap what is:

1. the DNS server?

2. the domain name for which the IP address is needed?

3. the IP address of the domain if any?

n

1.6.2 Which one?

According to the file nslookup-whoseone.com.pcap what is:

1. the DNS server?

2. the domain name for which the IP address is needed?

3. the IP address of the domain if any?

1.7 Ping-pong

1.7.1 Are you there?

According to the file ping.pcap :

1. what is the node 127.0.0.1 doing?

2. Is the node 127.0.0.2 on the network?

1.7.2 Who has this IP?

According to the file arp.pcap and to ARP (RFC826 (November 1982)). What is the source trying to do? What is ARP used for? If ever a host does not respond to ping (i.e., for security reasons), how could you check if the host is up anyway ?

2 Physical layer

2.1 General

2.1.1 Aims

What are the layer-1 goals?

2.1.2 Name it

What are the common (*commercial*) name of:

1. IEEE 802.11

2. IEEE 802.15.1

3. IEEE 802.15.4

What is IEEE 802.15 related to? What does WPAN stand for?

2.2 Encoding, encrypting, decoding

It is important to know what are the differences between encoding and encryption. Following questions are related to theses subjects.

2.2.1 Encrypt?

What are the differences between encoding and encryption?
What are the two main kinds of encryption? Their advantages?
Name three well known cryptographic methods and three well known encoding methods.

2.2.2 Encode it

The string "Zp" (which does not mean anything but has a nice binary value!) is, according to ASCII, 0x5a70. Encode it using:

1. Multi-Level Transmit

2. Alternate Mark Inversion

3. Manchester (or differential Manchester)

4. Biphase Mark Code

2.2.3 Decode it

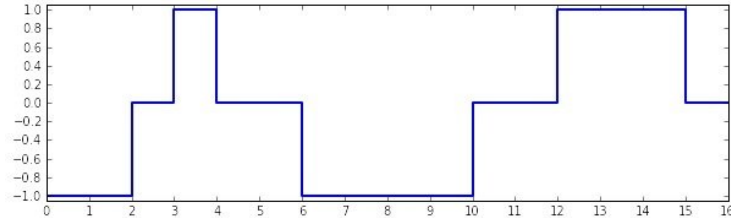What are the ASCII characters of theses images:
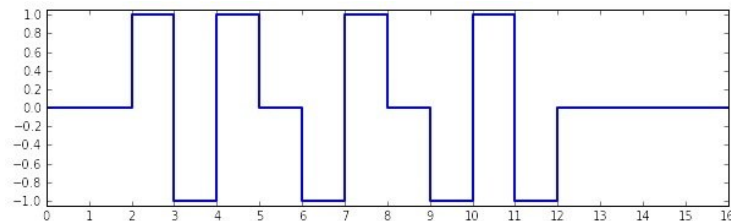

Figure 1: MLT3 encoded

Figure 2: AMI encoded

4

2.3 For *Oh* For error

2.3.1 Calculate it

What would be the output of the binary: `0b0011 0000 1110 1001` using the error detection methods:

1. Repetition (2)

2. Parity (odd)

3. Parity (even)

4. Checksum (over 4 bit)

5. MD5 hash

2.3.2 Validate it

Are theses received data correct? NB: detection values are in square brackets.

1. Using repetition (2), was received: `0b0011 0011 0000 0000 1110 1001 1001 1001`

2. Using parity (odd), was received: `0b1011[1] 1010[0] 1100[1] 0111[1]`

3. Using parity (even), was received: `0b1011[1] 1010[0] 1100[1] 0111[1]`

4. Using checksum (over 4 bit), was received: `0b0011 0111 0010 0010 1110 1001 1101 1001 [1011]`

5. Using MD5, was received the string (without the quotes!): `"that's way too long..."`
   the md5 sum: `[3be37cad170213a8ad936c0640e3238b]`

2.3.3 Correct it

By using MDPC (Multidimensional parity-check code) the data received are: `0x01 09 0e 06 03 09 0b 0c`.
Are the data correct? What would be the correction?

0x01	0x09	0x0e
0x06	0x03	0x09
0x0b	0x0c	

Figure 3: Data received with MDPC

3 Data layer

3.1 General

3.1.1 Aims?

What are the main objectives of the data layer?

3.1.2 Composition

What are the sublayer of the data layer?

3.2 Ethernet packet decoding

What is the objective of the packet 4?

0000	ff	ff	ff	ff	ff	ff	fa	ba	00	ab	ab	af	08	06	00	01
0010	08	00	06	04	00	01	fa	ba	00	ab	ab	af	ac	11	22	37
0020	00	00	00	00	00	00	ac	11	00	f9	00	00	00	00	00	00
0030	00	00	00	00	00	00	00	00	00	00	00	00				

Figure 4: Layer 2 packet