

#### **HKUSTx:** ELEC1200.3x A System View of Communications: From Signals to Packets (Part 3)



Pre-course Materials

- Topic 1: CourseOverview
- ▼ Topic 2: The Link Layer

#### 2.1 Link Layer

Week 1 Quiz due Jan 25, 2016 at 15:30 UTC

# 2.2 Multiple Access Protocols

Week 1 Quiz due Jan 25, 2016 at 15:30 UTC

#### 2.3 Aloha Protocol

Week 1 Quiz due Jan 25, 2016 at 15:30 UTC

# 2.4 Efficiency of Slotted Aloha

Week 1 Quiz due Jan 25, 2016 at 15:30 UTC Topic 2: The Link Layer > 2.5 Lab 1: Link Layer > LAB 1 - TASK 2

Bookmark

LAB 1 - TASK 2 (EXTERNAL RESOURCE) (1.0 points possible)

### 2.5 Lab 1: Link Layer

Lab due Jan 25, 2016 at 15:30 UTC

# MATLAB download and tutorials

## **LAB 1 - TASK 2**

In this task, you will learn how to create the frame that is used at the link level to send the datagram.

#### **INSTRUCTIONS**

The MATLAB code in the below window is similar to the code described in task 1 where we simulate the The only difference in the code is that here we do not use the function **createFrame** to generate the fr detail.

Here, we consider a modified (simplified) frame structure, which consists four blocks, each with four bits blocks contain the preamble, the node ID, the datagram, and the checksum. An example of the frame is

 $[\ 1\ 0\ 1\ 0\ \ 0\ 0\ 0\ 1\ \ 1\ 0\ 1\ 0\ \ 0\ 0\ 0\ 1]$ 

The preamble, which is "1010" in this example, is a fixed sequence of bits utilized to indicate the arrival example, is the binary representation of the user's **id**. Here, the user **id** is 1, indicating that the frame is id from decimal to binary is achieved by using the function **num2bin**. Given that the frame structure onl simulate a system with a maximum of 16 nodes. The third block, "1010", is the datagram of the user, wh **getNewDatagram**.

The final block contains the checksum bits, which are "0001" in this example. The checksum bits are uti the transmission (recall the channel coding schemes we learned in Part I). In this simulation, the checks for the first three blocks of the frame. Specifically, we first divide the first 12 bits in the frame into 4 grou below.

[ 1 0 1 0 ] [ 0 0 0 1 ] [ 1 0 1 0 ]

Then, the 4 checksum bits are computed by performing the "exclusive or" operation over all three bits in Equivalently, we can obtain the checksum bits by binary addition. The exclusive or of the bits in the first or of the bits in the rightmost column is 1. As a result, the checksum bits for the above example are [0 0 counting the number of 1s in the words and set the bit of the checksum to 1 if this number is odd, and to

we have two ones, which is even, so the checksum for that bit is 0.

% % % % Do not change the code below % % % %

Your task is to create the frame for the datagram and store the result inside the variable **frame**. In orde user's **id**, you can use the function **num2bin(id,4)**, where the second argument indicates the length of be **[1 0 1 0]** for this simulation. Please, revise the code between the lines

**Save** 

```
% % % % Revise the following code % % % % % and
```

% % % % Do not change the code below % % % %

```
Do not change other parts of the code and do not use the function createFrame.
```

### **Your Solution**

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```
checksum = [0 0 0 0];
checksum = bitxor(preamble, id_bin);
checksum = bitxor(checksum, datagram);
%frame = rand(1,16)>0.5;
frame = [preamble id_bin datagram checksum]
```

C Reset MATLAB Document

# **Assessment Tests: Passed**

✓ Is problem setup unmodified?

%disp(frame);

۸r۵	tho	trames	correct?
Ale	uie	Hallies	correct?

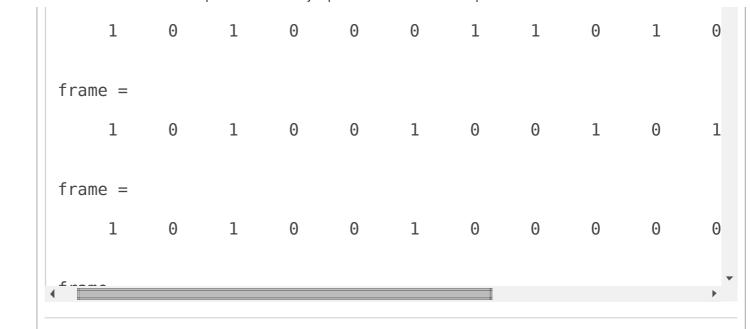
Output										
frame =										
1	0	1	0	0	0	0	1	1	1	0
frame =										
1	0	1	0	0	0	1	0	0	0	1
frame =										
1	0	1	0	0	0	1	1	0	1	1
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frame =										
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frame =	1 1/131(2	2.3 Lab 1.	Ellik Edyel	7 2220120	o.sx course	.ware   cax				
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	frame =										
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	frame =										

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frame =										
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1	0	1	0	0	0	0	1	0	0	0
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1	0	1	0	0	1	0	0	0	0	0
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frame =										
1	0	1	0	0	0	0	1	1	0	0
frame =										



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