

## IP Packet, Binary and Hexadecimal Application, Lesson Plan

Timing: 30-45 minutes

Big Ideas: (First Introduction of) The Internet, (Reinforcement of) Abstraction

Materials: To complete this exercise you will need index cards, envelopes, and a word that is as long as half the number of students in your class. In addition, you will need cooperation from colleagues in your building. So if you have a class of 20 students you will need: 10 index cards, 10 envelopes, cooperation from 10 colleagues who have a room, and a word that is 10 characters long.

### BEFORE THE ACTIVITY

- 1.) Talk to your colleagues in your building that have a room during the period you teach. Make sure they are ok with you leaving an envelope with them. They will give it to students for you during the period you teach this course.
- 2.) Convert the cooperative colleagues' room number into binary.
- 3.) Put your word in a mixed up order. Keep track though of the desired order. For example, I did TEAMWORK. So T had order 1, E had order 2, and so on. Convert the order to binary.
- 4.) Convert the room number and word into an IP Address. For example: Room.Number.Order looked like 1010.1000.011 for room number 168 order 3. Write this on an index card.
- 5.) Convert your word's characters to hex using this:  
[http://www.cisco.com/c/en/us/td/docs/ios/12\\_2/configfun/command/reference/ffun\\_r/frf019.pdf](http://www.cisco.com/c/en/us/td/docs/ios/12_2/configfun/command/reference/ffun_r/frf019.pdf). Put the character (hex) on an index card in the envelope. On the outside of the envelope write the room number and teacher where this will be stored.
- 6.) Make a table where you decide on team members and the "IP Address" (Room.Number.Order) that goes with each team of 2.
- 7.) Make a second table where you have the DECIMAL representations of every character. The following table will work for most situations.
- 8.) Finally make a table so you remember which team has which room number and character (I used this as my "cheat sheet" throughout this activity).

Here are the decimal representations of a character.

Decimal number	Character		Decimal number	Character		Decimal number	Character
32	space		74	J		85	U
33	!		75	K		86	V
65	A		76	L		87	W
66	B		77	M		88	X
67	C		78	N		89	Y
68	D		79	O		90	Z
69	E		80	P			
70	F		81	Q			
71	G		82	R			
72	H		83	S			
73	I		84	T			

#### ON THE DAY OF THE ACTIVITY:

- 1.) Show the table from step 6 above; that has the team members and their IP Address. I also gave them index cards with this information.
- 2.) CHECK their IP Address conversion before allowing them to go out of the room. When they correctly identify the room number they are heading toward have them begin their "journey" toward the IP Address.
- 3.) When they arrive at the address, they will pick up their packet (envelope). Inside the envelope is a hex representation of a character.
- 4.) When they return to the classroom, they will open the packet and see a table (above) with digital representations of characters. They will need to convert the hex character to digital to find out the character they represent. THEN they will need to use the Order (end of IP Address) to determine the order that their character plays in the word. Prompting here helps... "What is the only part of the IP Address you have not used?" "Could someone put some blank spaces on the board?" "How many characters are in our word?"
- 5.) Together they will spell a word, then connect to the internet. The IP Address got each student to their PACKET which used hex... why? You can also discuss how this was an ABSTRACTION of the internet and discuss SOME of the details that were removed without overwhelming them with too much vocabulary. Are some IP Addresses actually in binary? Are all? Etc.