Bits and Bytes

Prerequisite: Know **Binary** and **Hex**. View previous document, "**Binary, Decimal, and Hex**" for help.

Bits

A **bit** (short for "**BI**nary digi**T**") is the smallest unit of data in a computer. The bit can be represented by a 1 or 0. A single bit can be used to represent on/off or yes/no but a string of bits can represent complex data.

For example, computers run on electricity, so when a computer wants to send information from one place to another it sends these "pulses" of electricity over a wire. A higher voltage pulse will mean a 1, and a lower voltage pulse will mean a 0. But there are other parts of a computer that still use 0s and 1s that aren't electric, like the hard drive. The hard drive stores 1s and 0s by changing the magnetic poles of small parts of a metal disk. Positive and negative charges would be 1s or 0s.

A **nibble** (sometimes spelled **nybble or nyble**) is a string of four bits. Nibbles can be used to represent a single hexadecimal digit as there are exactly 16 combinations between those four bits.

Binary	Hexadecimal
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	A
1011	B
1100	C
1101	D
1110	E
1111	F

Bytes

A **byte** consists of 8 bits, sometimes also referred to as an octet. A byte generally comprises 8 bits that represent a letter in the alphabet, a single digit number, a punctuation mark, or other character.

So how exactly does a byte hold information? For example, ASCII tables are used to translate a byte to a letter in the alphabet. Below is a small portion of the table. On the left hand side is the value and on the right side is the letter it represents.

Fox example: This word is four bytes long.

Binary: 01000010 01001001 01010100 01010011
Decimal: 66 105 116 115
ASCII: B i t s

So the binary stream is the word "Bits".

This is only one example. Bits and bytes can hold all digital data at its lowest level.

ASCII Character Codes Table

Special Chars		Upper Case		Lower Case	
9	\t (Tab)	65	A	97	a
10	\n (NL)	66	B	98	b
13	\r (CR)	67	C	99	c
32	*Space*	68	D	100	d
33	!	69	E	101	e
34	"	70	F	102	f
35	#	71	G	103	g
36	$	72	H	104	h
37	%	73	I	105	i
38	&	74	J	106	j
39	'	75	K	107	k
40	(	76	L	108	l
41	)	77	M	109	m
42	*	78	N	110	n