



Introduction

Lecture 1 | Part 2 | CSE421 – Computer Networks

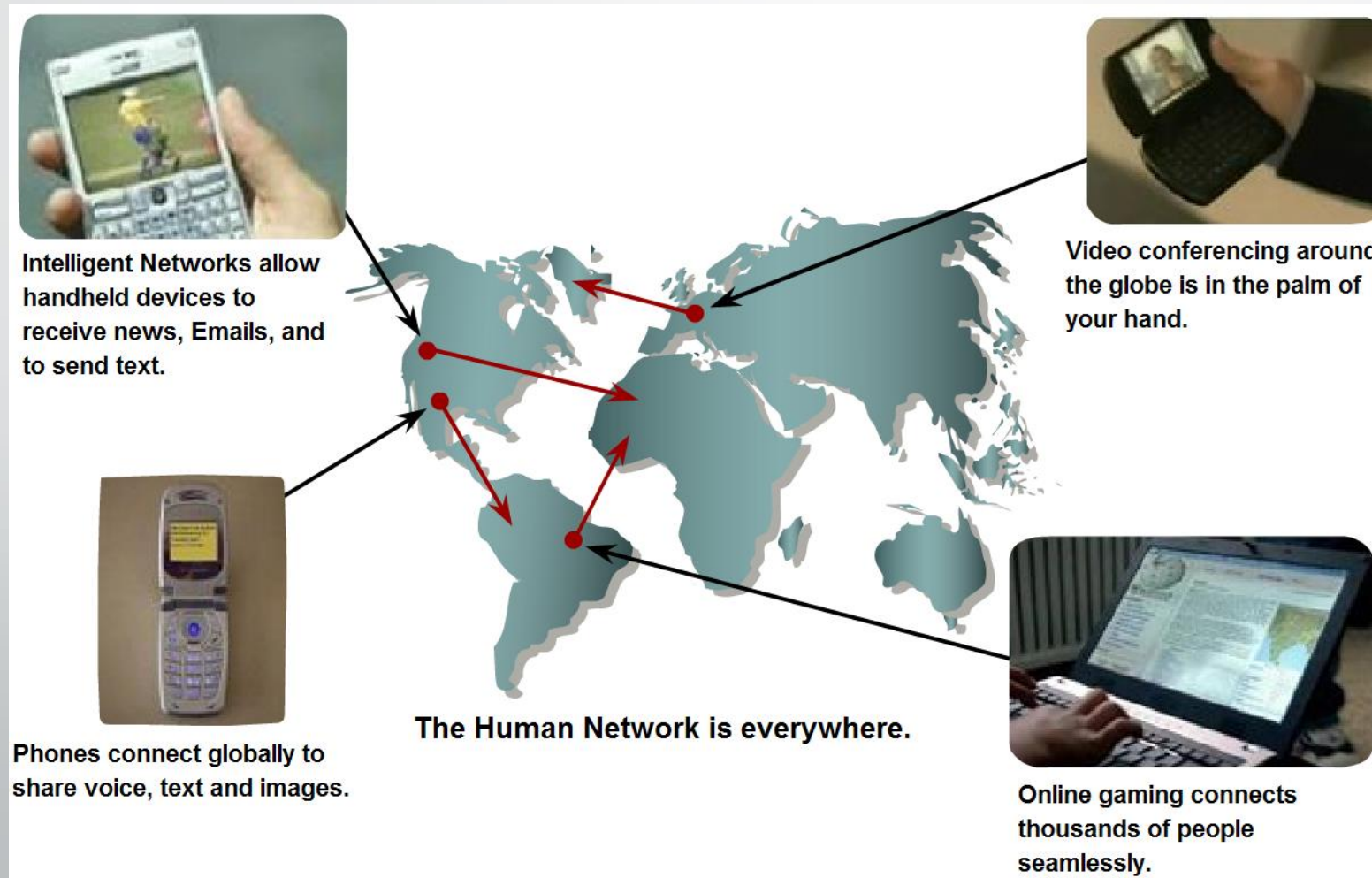
Department of Computer Science and Engineering
School of Data & Science

Objectives

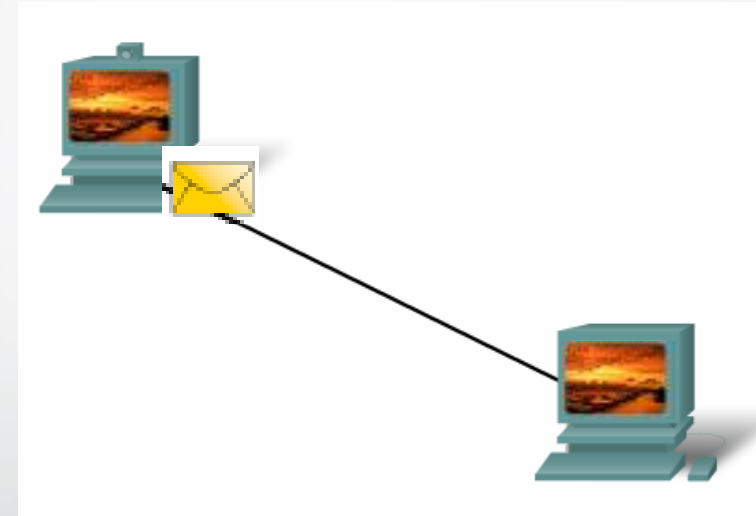
- Components of network
- Data representation
- Types of network

So, what's the purpose of networks?

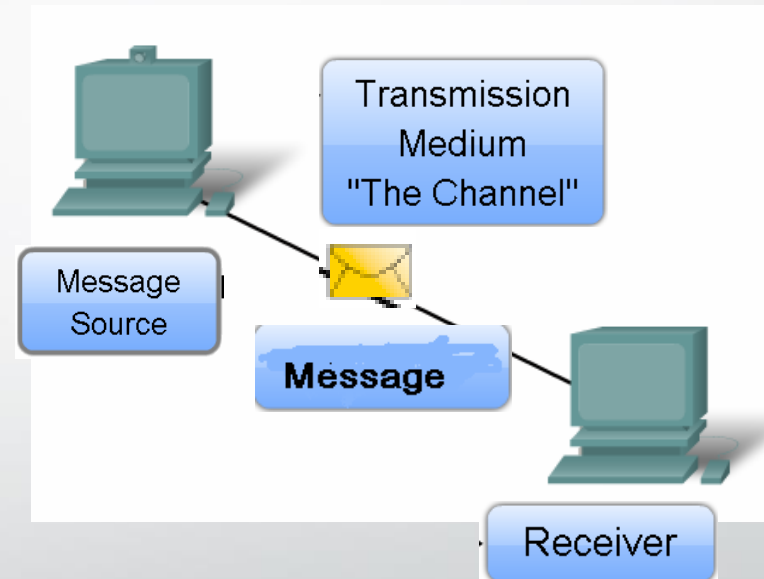
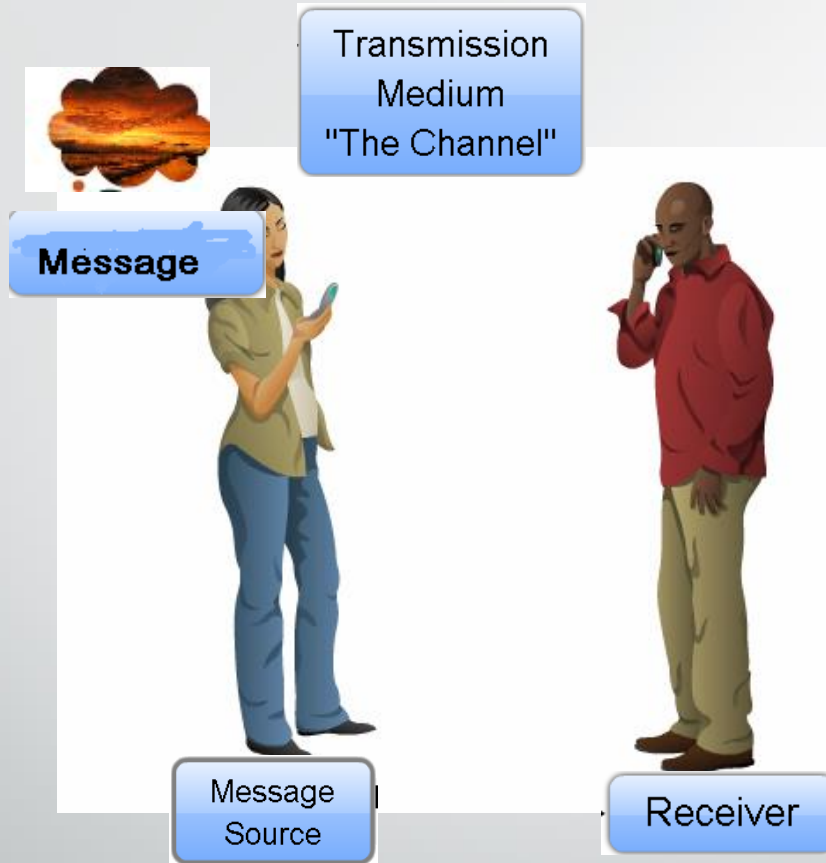
- **Communications!**



Elements of Communication



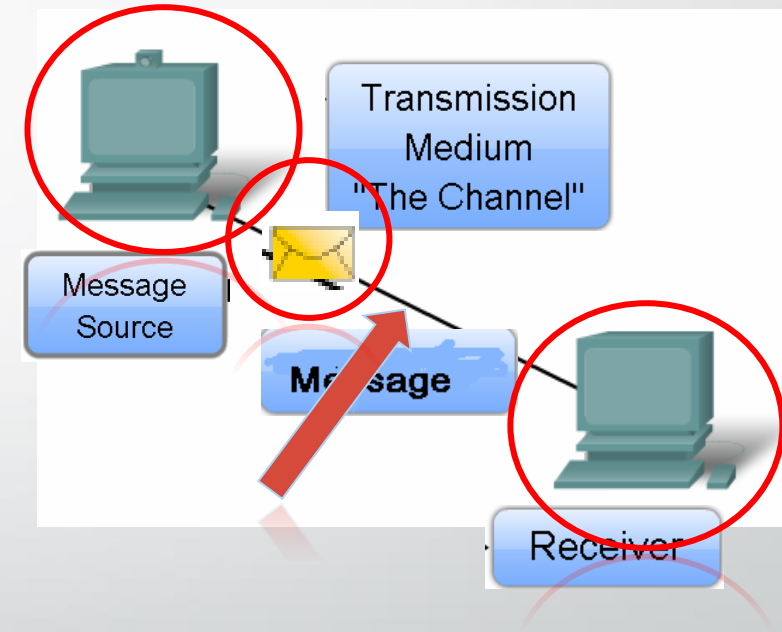
Elements of Communication - Example



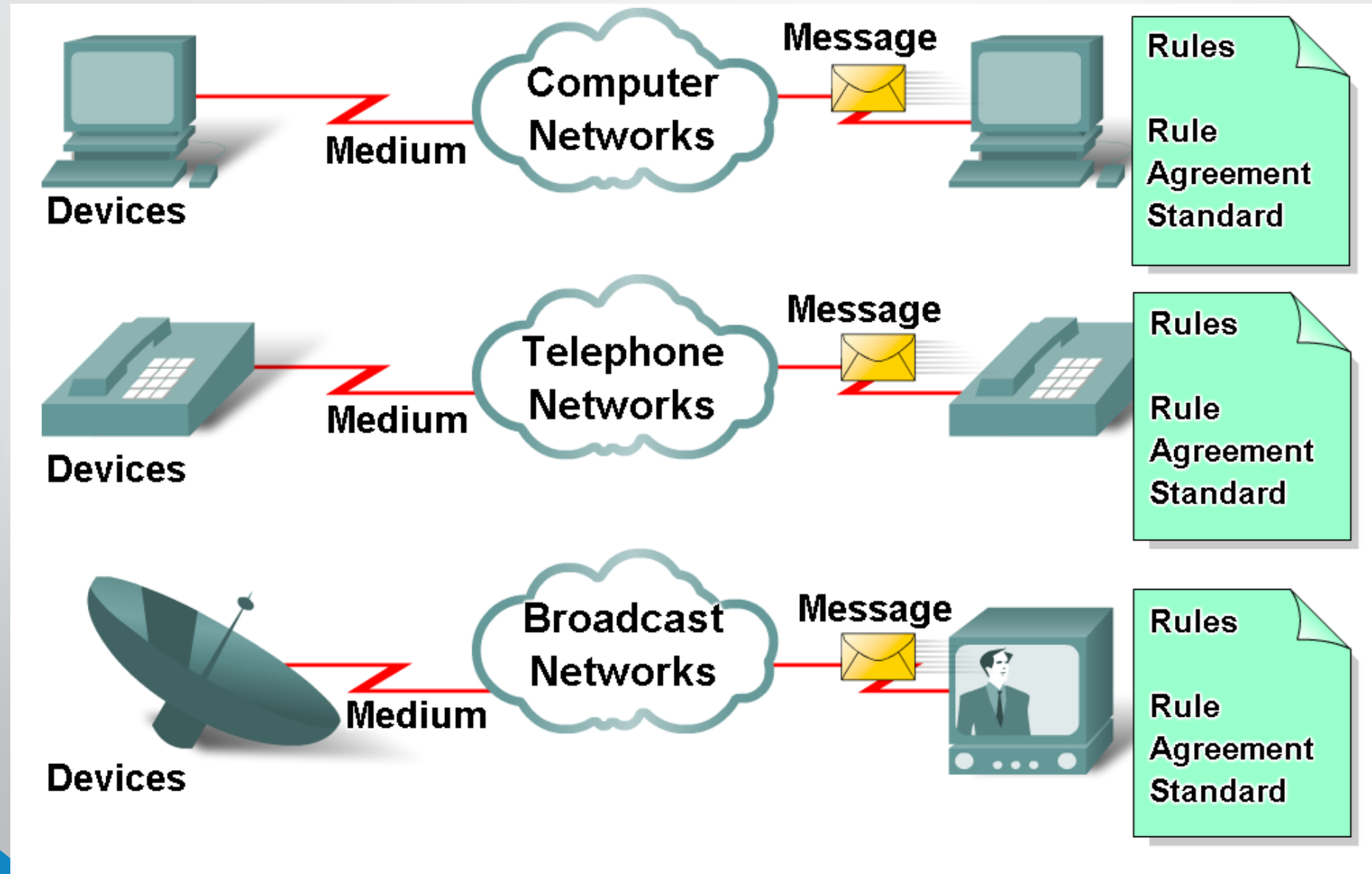
- What are the elements?

Elements of Communication

- **Devices (Sender/Receiver)**
 - These are used to communicate with one another
- **Medium**
 - This is how the devices are connected together
- **Messages**
 - Information that travels over the medium
- **Rules**
 - Governs how messages flow across network

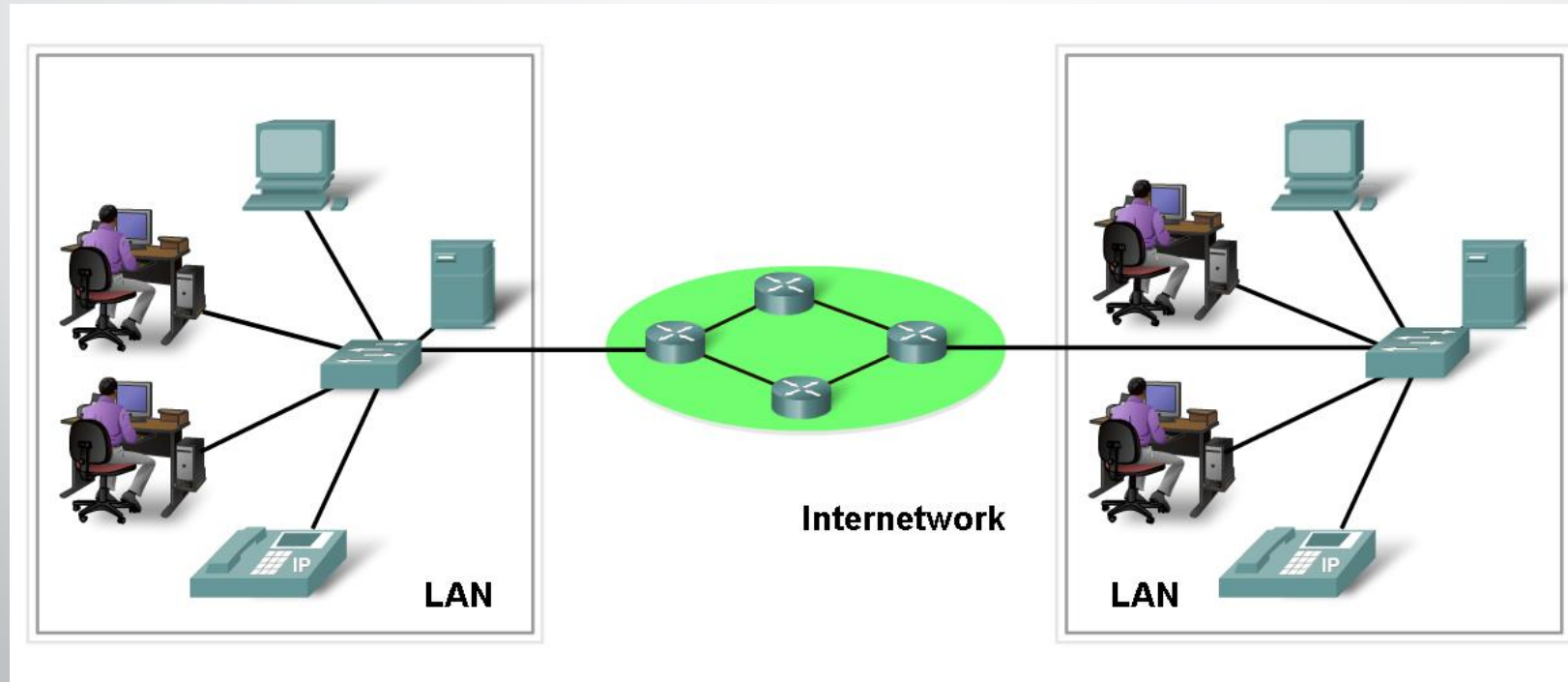


Elements of Communication



Network Elements/Components

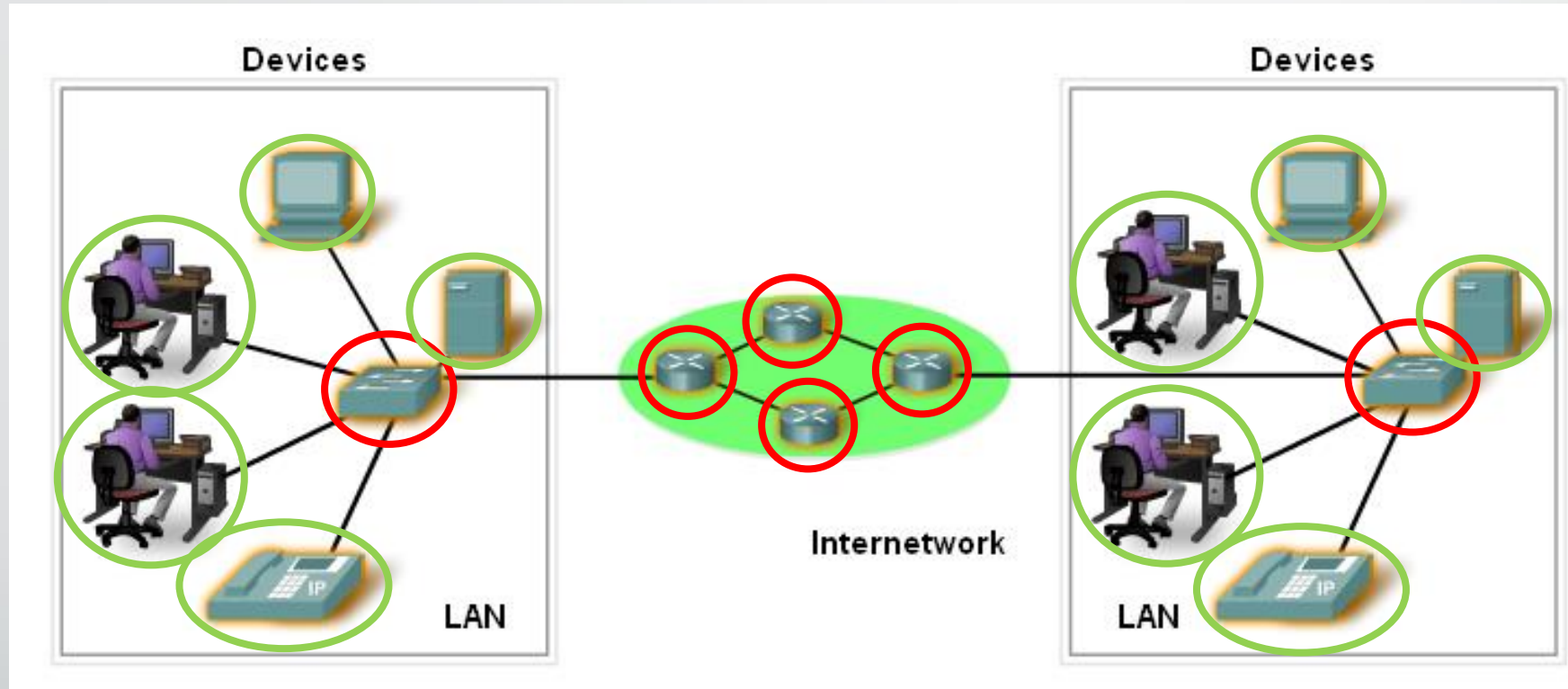
- **Network Devices**
 - Hardware (Devices)
 - Software (Services and Processes)








Network Component - Devices

- Two types of devices:
 - **End Devices:**
 - Interface with human network & communications network
 - Data originates with an end device and arrives at an end device
 - **Intermediary Devices:**
 - Provides connectivity between end devices.
 - Manages data as it flows through the network

Network Component - Devices



End Devices			Intermediary Devices	
Personal Computers	Server		Router	Switch
				

Network Component –Devices

- Examples of Intermediary Devices

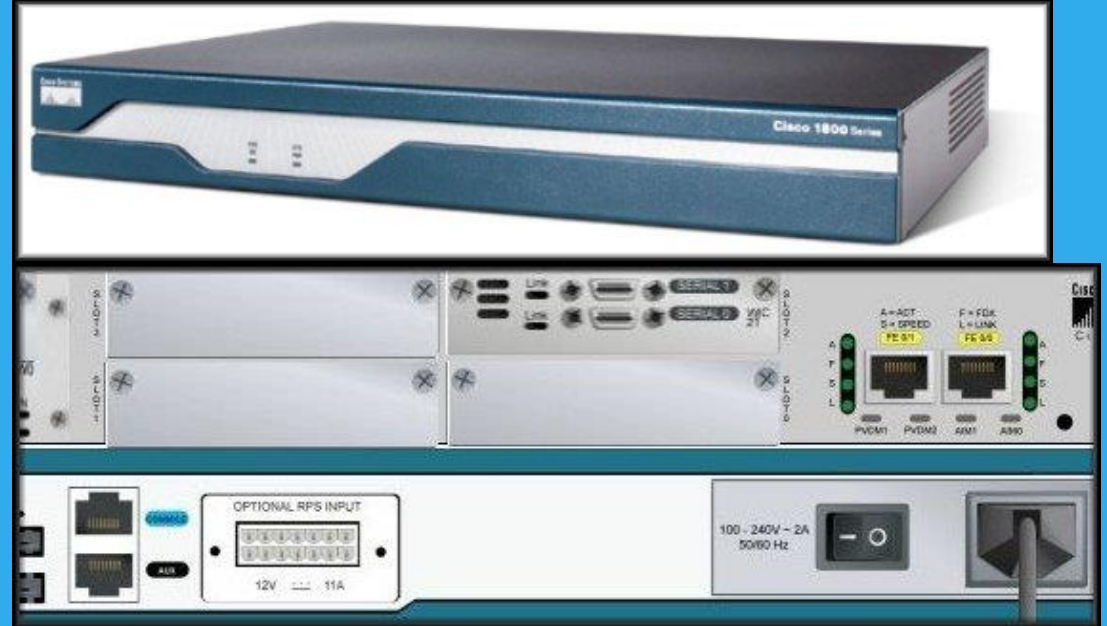
Hub



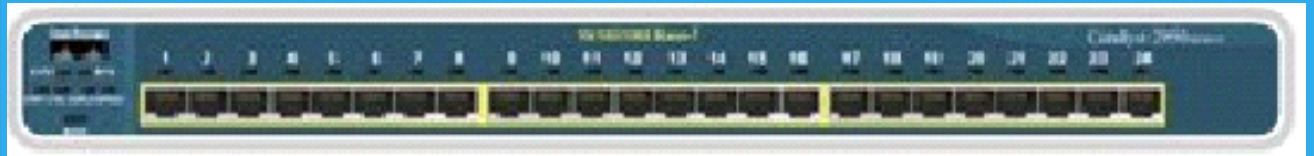
Wireless Router



Router



Switch



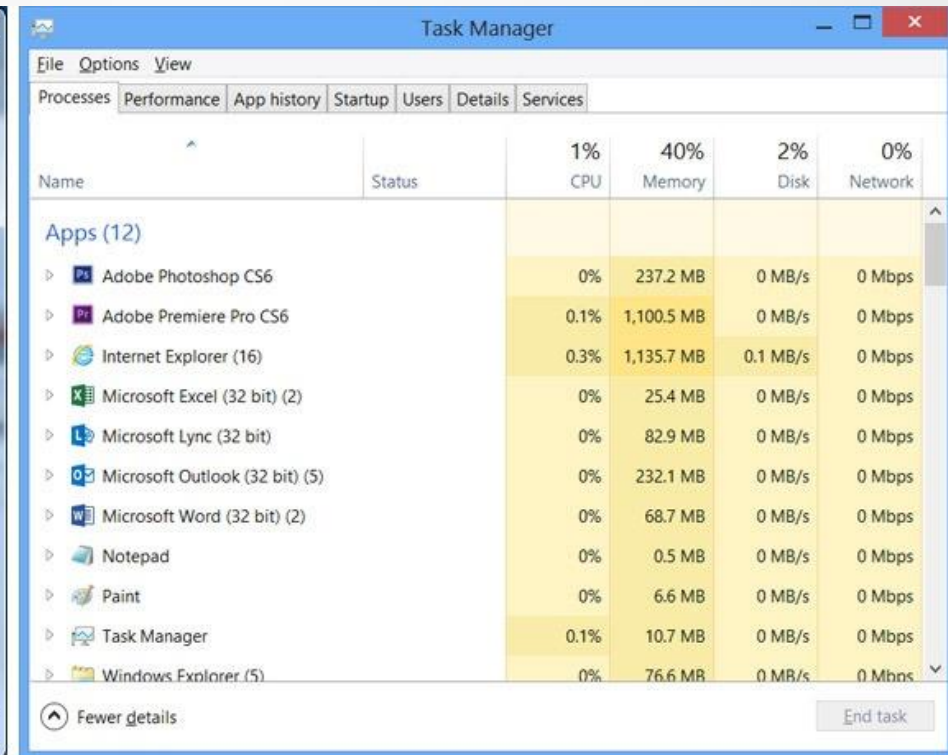
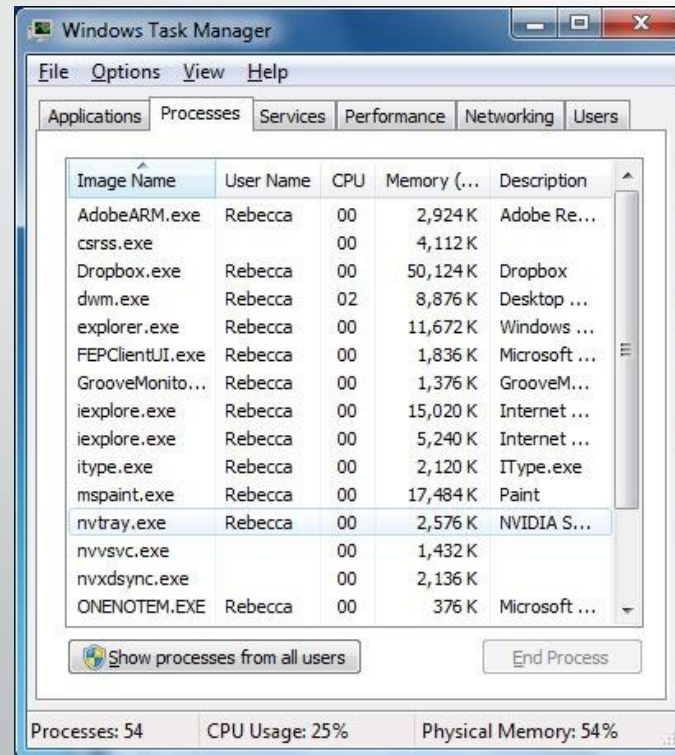
Software

- **Services :**
 - Provides information in response to a request.
 - For example **e-mail hosting services** and **web hosting services**.



Software

- **Processes :**
 - Provide the functionality that directs and moves the messages through the network.
 - Processes are less obvious to us but are critical to the operation of networks.



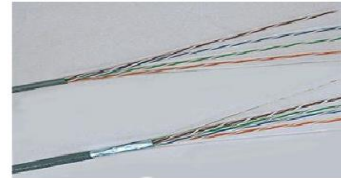
Media

- The channel over which a message travels

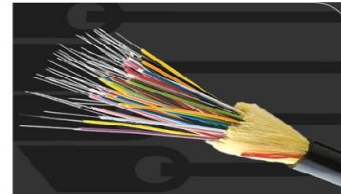
Media Types	Description
Metal wires within cables	Uses electrical impulses
Glass or plastic fibers within cables (fiber-optic cable)	Uses pulses of light.
Wireless transmission	Uses modulation of specific frequencies of electromagnetic waves.

Network Media

Copper



Fiber Optics



Wireless



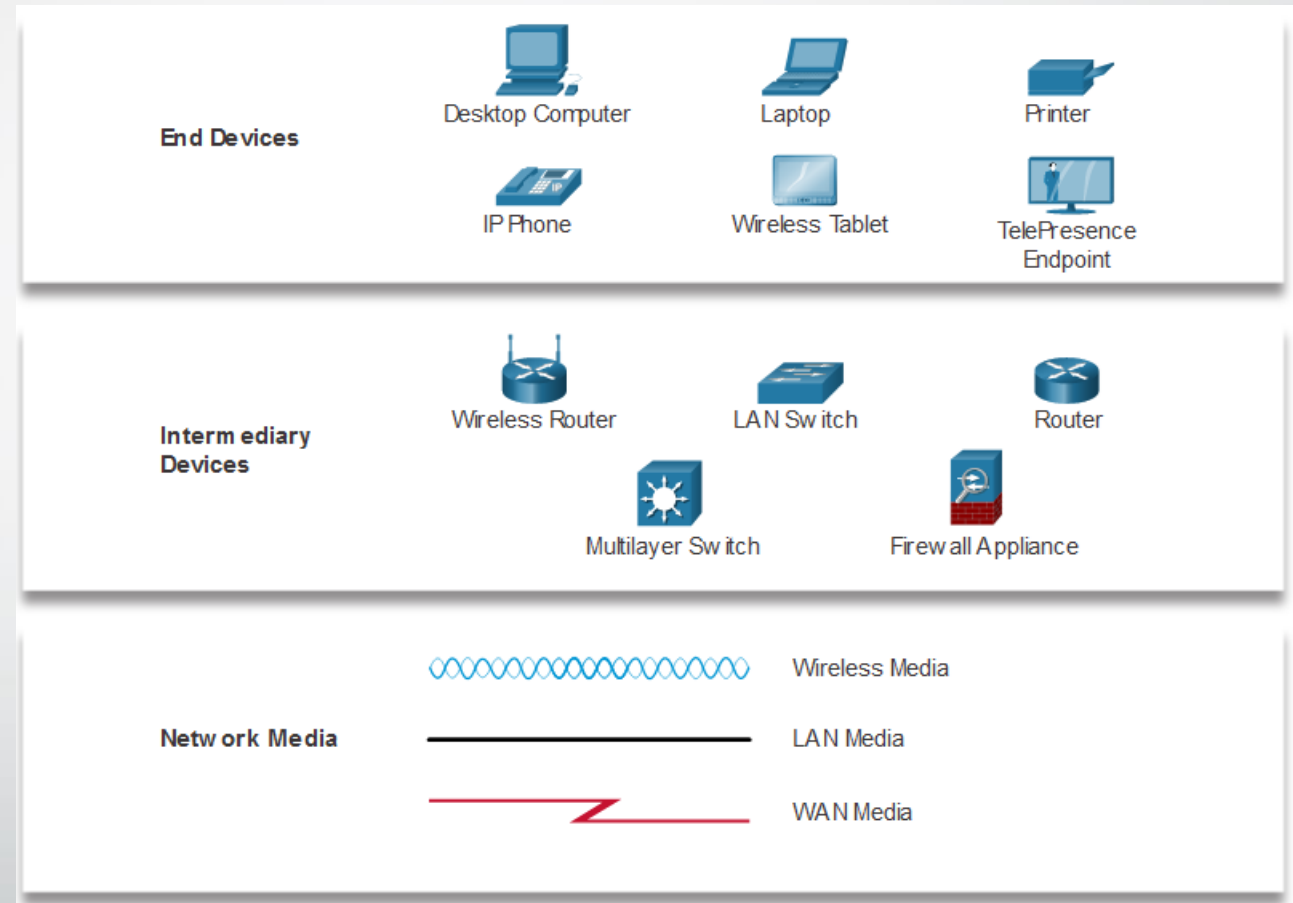
Network Representations

Network diagrams, often called **topology** diagrams, use symbols to represent devices within the network.

Important terms to know include:

- Network Interface Card (NIC)
- Physical Port
- Interface

Note: Often, the terms port and interface are used interchangeably



Message – Data Representation

- Information today comes in different forms such as
 - text, numbers, images, audio, and video

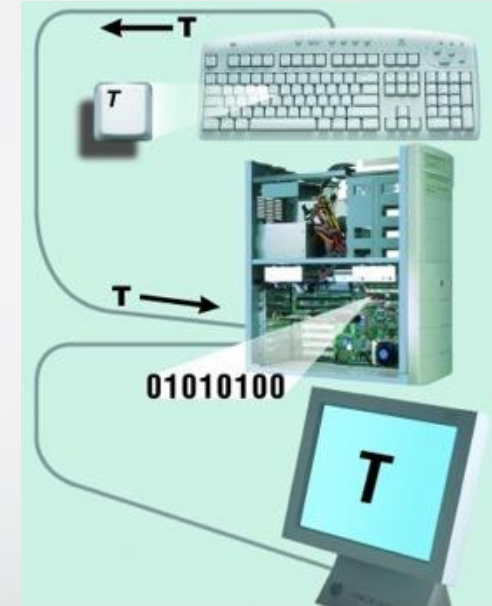
Type of Data	Standards
Alphanumeric	ASCII, Unicode
Image	JPEG, GIF, PCX, PNG, TIFF, BMP, etc.
Motion picture/Video	MKV, AVI, MP ₄ , MPEG-4, etc.
Sound	WAV, AU, MP ₃ , etc.
Outline graphics/fonts	PDF, PS, AI, PostScript

Data Representation - Text

- Different sets of bit patterns are designed to represent text symbols. Each set is called a code.
 - **ASCII**
 - American Standard Code for Information Interchange: 7-bit code/char, 1 bit for parity.
 - Constitutes the first 127 characters in Unicode and known as basic Latin.

























































ASCII Reference Table

	000	001	010	011	100	101	110	111
0000	NULL	DLE		0	@	P	`	p
0001	SOH	DC1	!	1	A	Q	a	q
0010	STX	DC2	"	2	B	R	b	r
0011	ETX	DC3	#	3	C	S	c	s
0100	EDT	DC4	\$	4	D	T	d	t
0101	ENQ	NAK	%	5	E	U	e	u
0110	ACK	SYN	&	6	F	V	f	v
0111	BEL	ETB	'	7	G	W	g	w
1000	BS	CAN	(	8	H	X	h	x
1001	HT	EM	)	9	I	Y	i	y
1010	LF	SUB	*	:	J	Z	j	z
1011	VT	ESC	+	;	K	[	k	{
1100	FF	FS	,	<	L	\	l	|
1101	CR	GS	-	=	M	]	m	}
1110	SO	RS	.	>	N	^	n	~
1111	SI	US	/	?	O	_	o	DEL



Data Representation - Text

- **Unicode:**
- 16 bit codes to represent a symbol.
- More characters can be represented.
- But takes up twice the space.

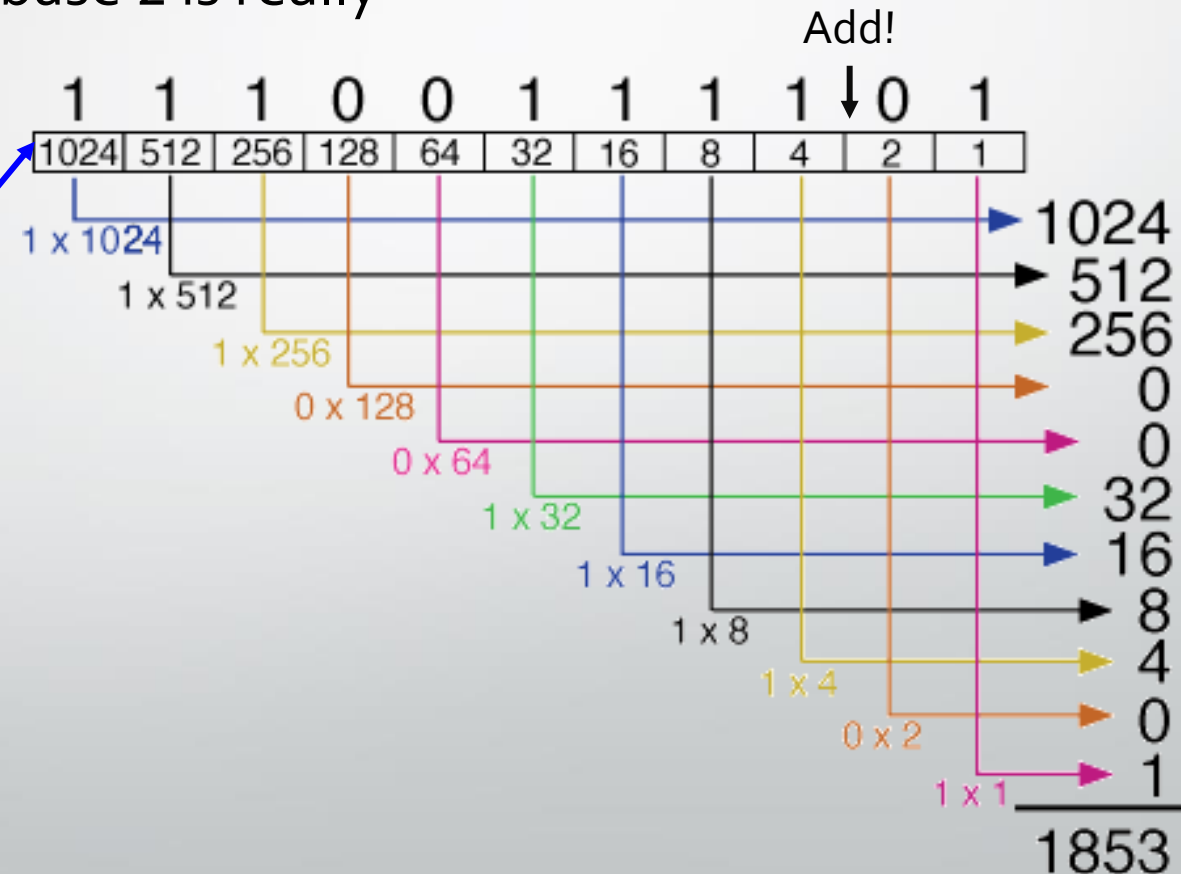
	060	061	062	063	064	065	066	067	068	069	06A	06B	06C	06D
0	 0600	 0610	 0620	 0630	 0640	 0650	 0660	 0670	 0680	 0690	 06A0	 06B0	 06C0	 06D0
1	 0601	 0611	 0621	 0631	 0641	 0651	 0661	 0671	 0681	 0691	 06A1	 06B1	 06C1	 06D1
2	 0602	 0612	 0622	 0632	 0642	 0652	 0662	 0672	 0682	 0692	 06A2	 06B2	 06C2	 06D2
	 0603	 0613	 0623	 0633	 0643	 0653	 0663	 0673	 0683	 0693	 06A3	 06B3	 06C3	 06D3

Data Representation - Numbers

- Numbers :**

- Directly converted in to binary which is base 2.
- The number 1853 in base 2 is really

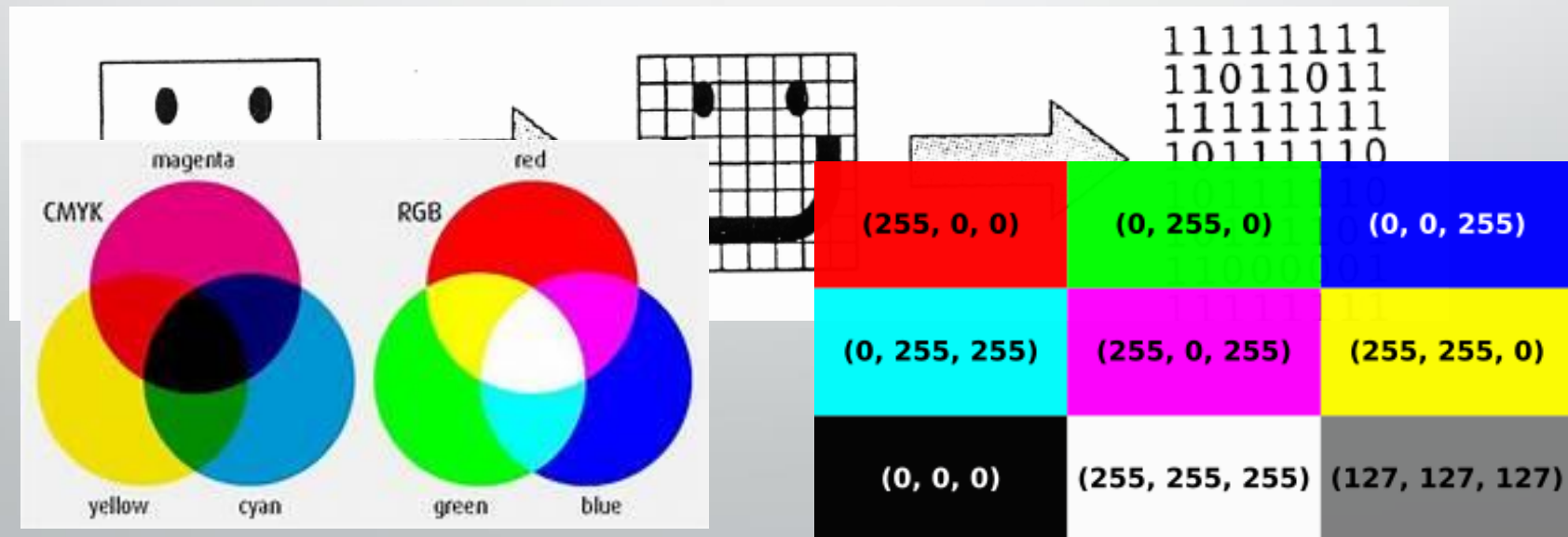
All the numbers are in power of two!



Data Representation - Images

- **Images**

- Also represented by bit patterns.
- A digital image is made up of small units called pixels. Each pixel is assigned a bit pattern whose size depends on the nature of the image.
- Color images uses RGB or YCM methods.

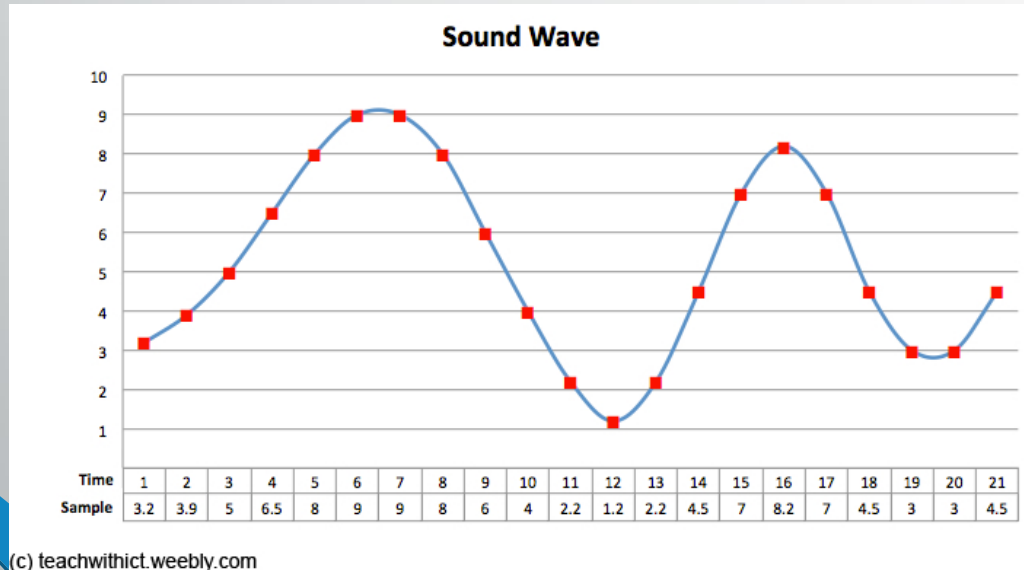


RGB

Data Representation – Audio & Video

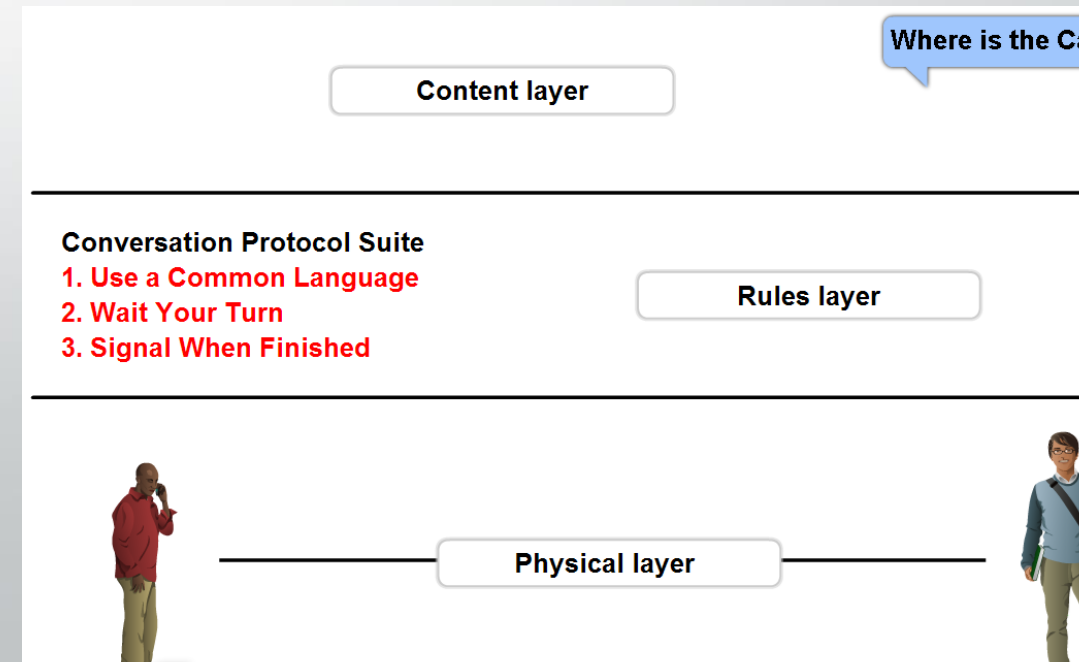
- **Audio**
- Continuous, not discrete
- Converted to digital or analog signal.

- **Video**
- Collection of frames(images) projected in sequence dynamically.
- Each image is converted to a bit pattern and stored.



Rules - Protocols

- A set of predetermined rules that govern communication.
- Defines:
 - What is communicated??
 - How it is communicated??
 - When it is communicated??



Types of Network

- **PAN – E.g. Bluetooth**
 - A network that connects computers, peripherals and other devices within a personal operating space.
 - Typical coverage within 10 meters
- **LAN – E.g. Ethernet, Wireless LANs**
 - Connects computers, peripherals and other devices within a building (e.g. office, home) or in a limited area.
 - Typical coverage 50 to 300 meters.



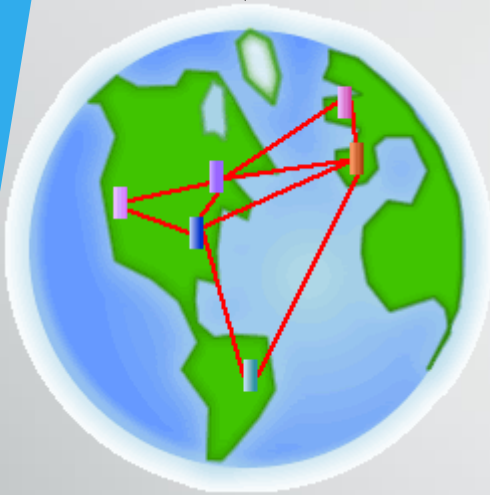
Types of Network

- **MAN** – E.g. Wi-Max
 - Is a city wide network.
 - The coverage limitation is not strict, but real implementation may have range of up to 50 km in urban, suburban, or rural area.
- **WAN** – E.g. PSTN, Cellular Networks (GSM etc)
 - A network that spans larger geographical area.
 - LANs separated by geographic distance are connected by a Wide Area Network (WAN).

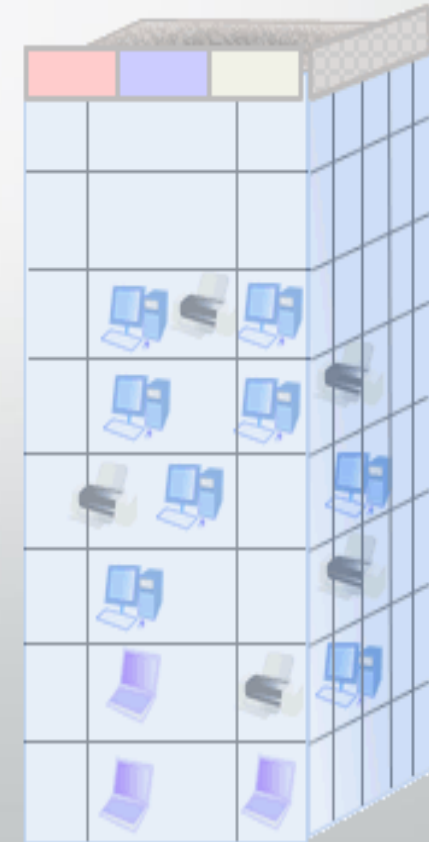


Types of Network – Can you identify?

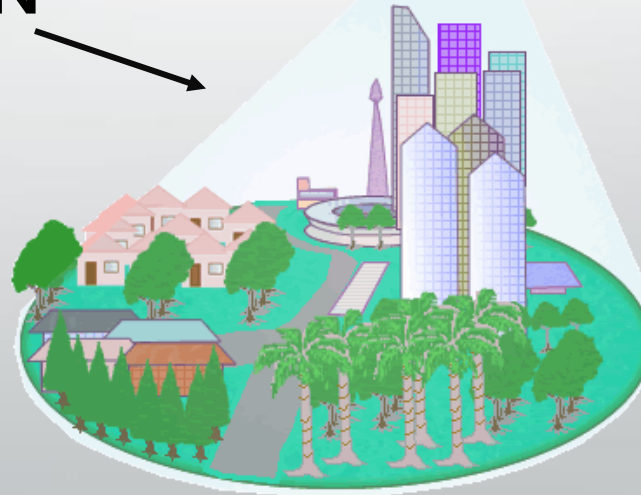
WAN



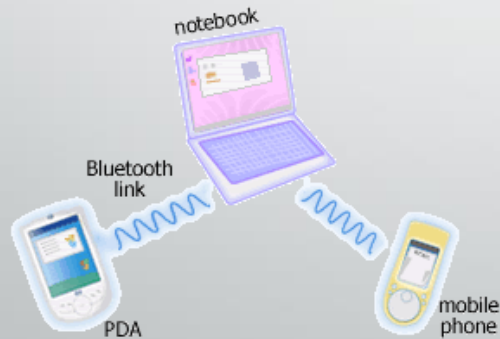
LAN



MAN

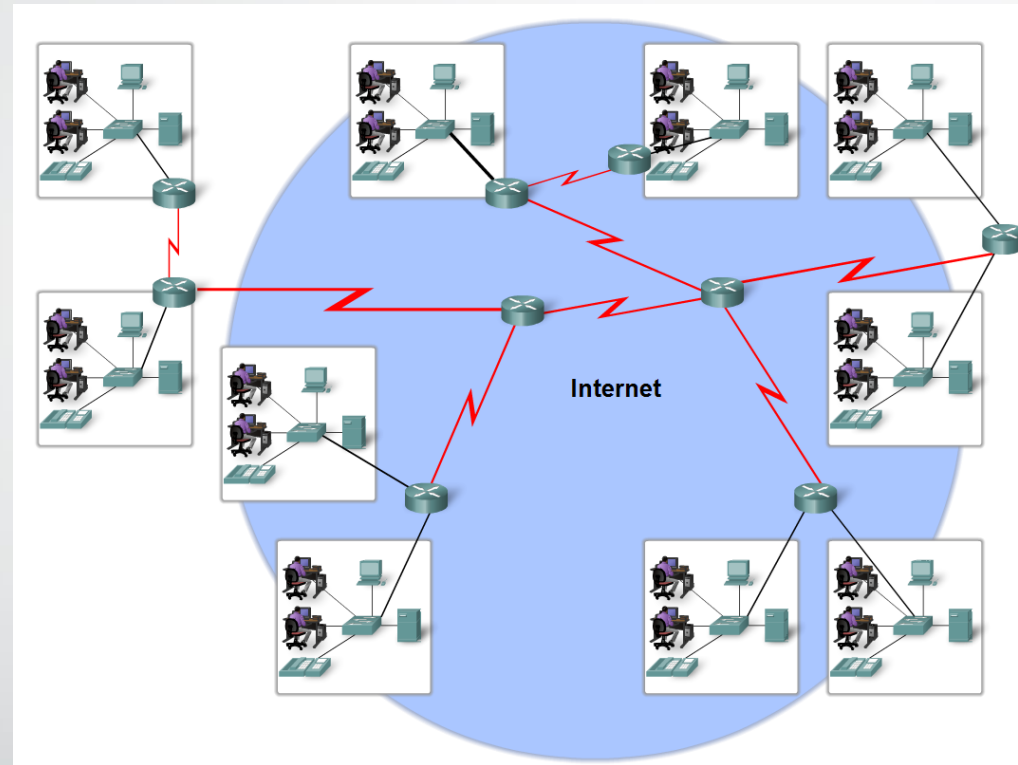


PAN



Internet

- The **Internet** is defined as a global mesh of interconnected networks

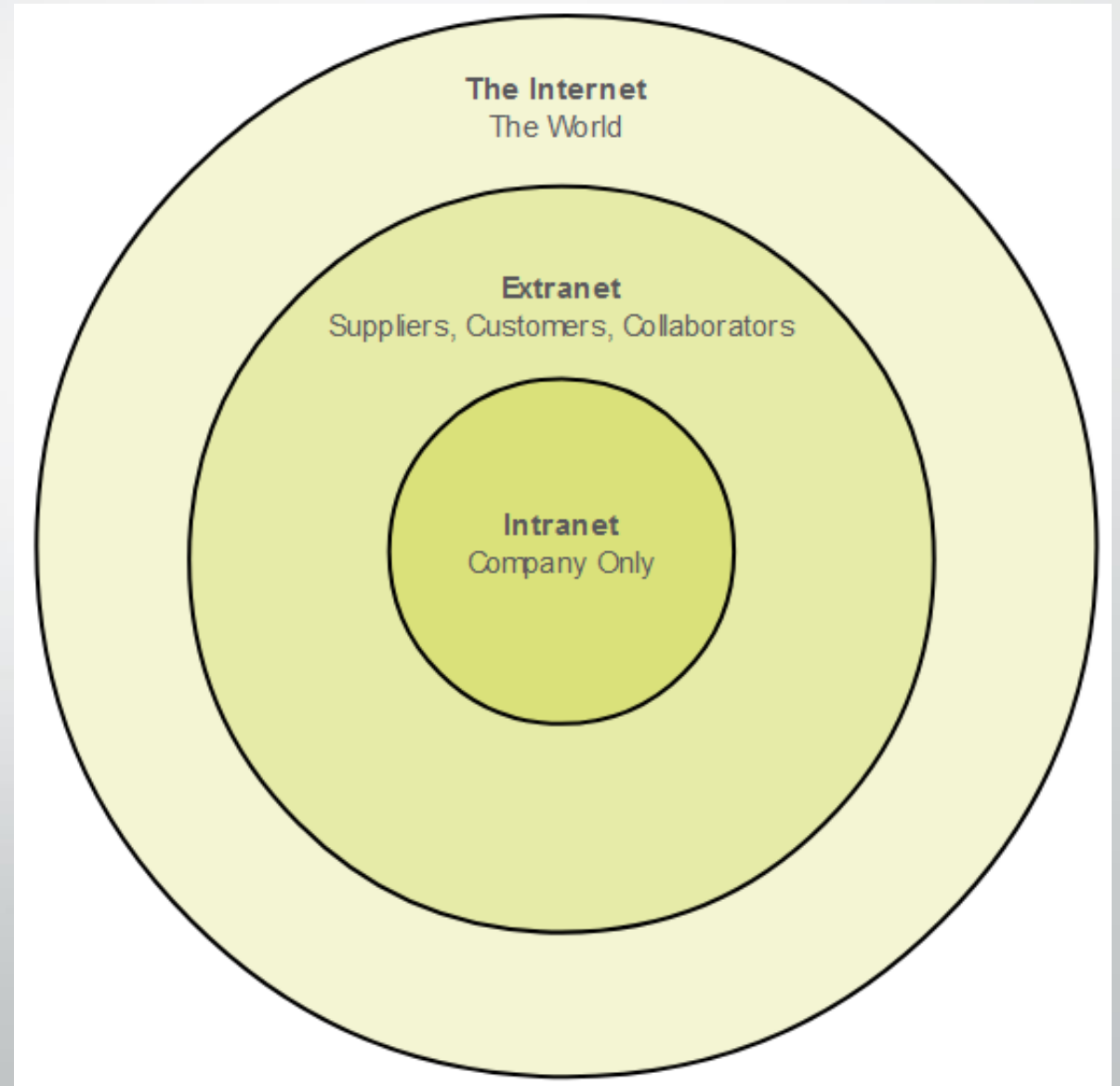


- What do you think **Intranet** is?

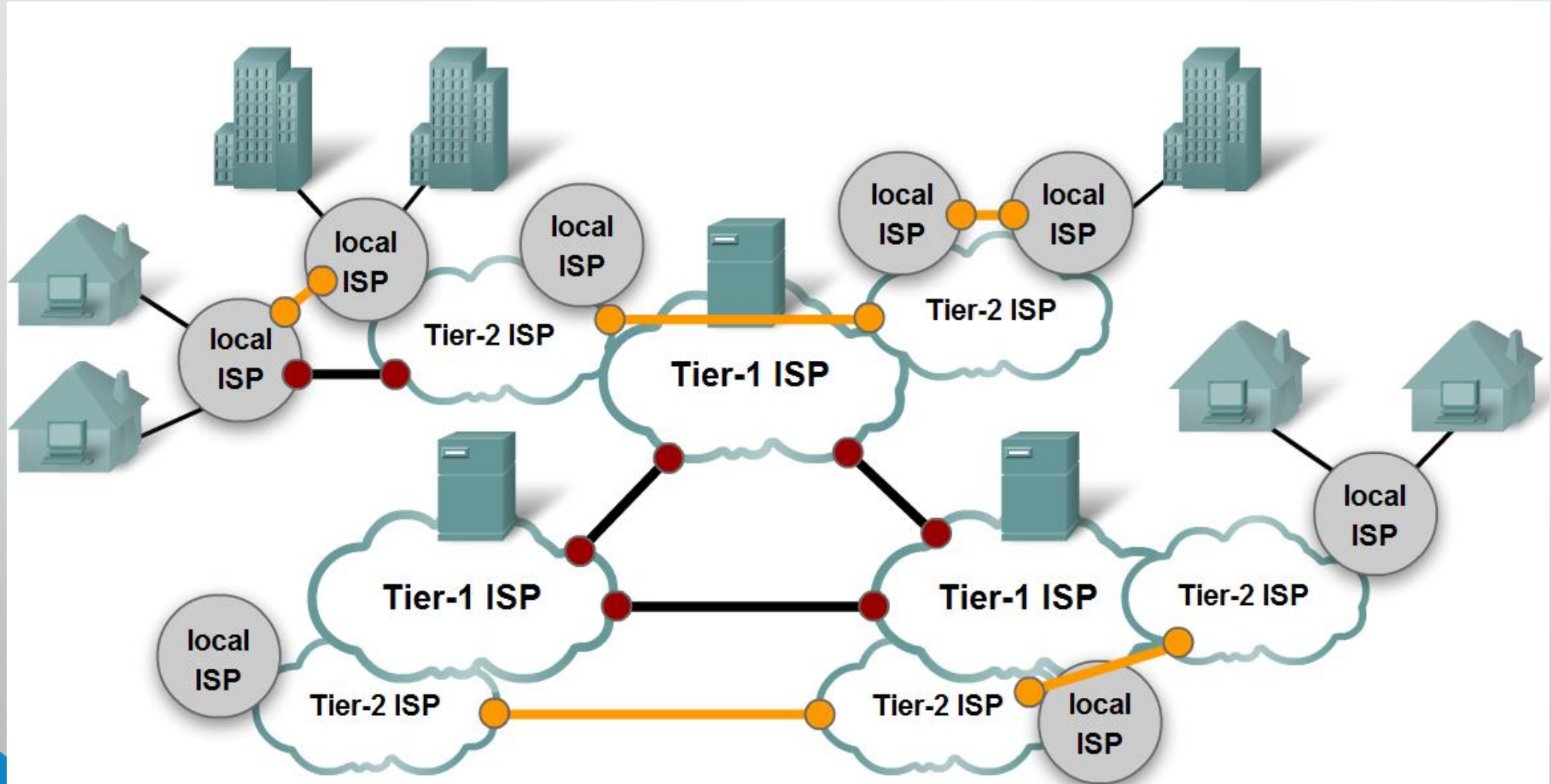
Intranets and Extranets

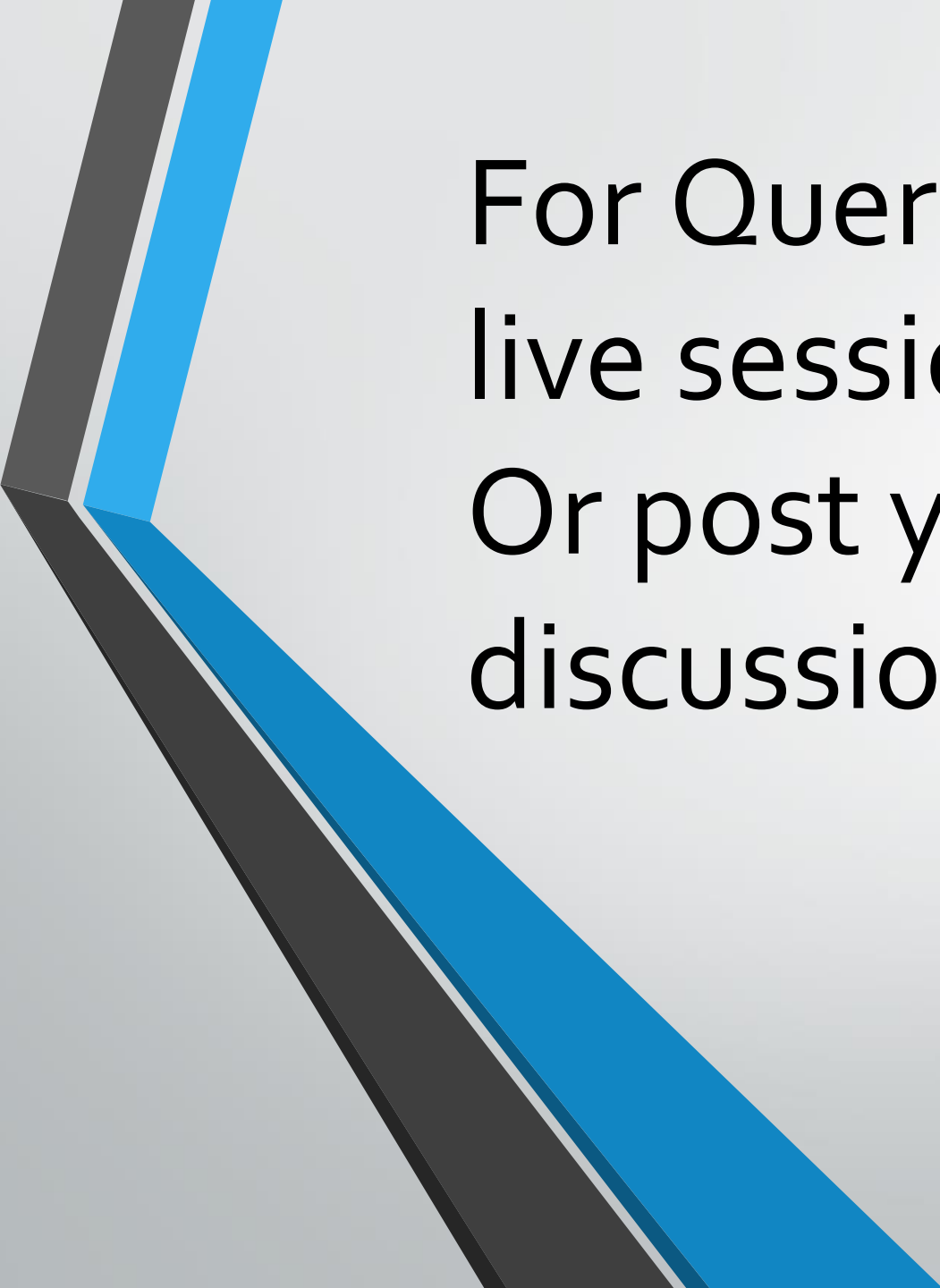
An **intranet** is a private collection of LANs and WANs internal to an organization

Extranet is used to provide secure access to their network for individuals who work for a different organization that need access to their data on their network.



Internet (Continued)





For Queries be present in the
live sessions.

Or post your queries in the
discussion board

Thank you