BCA (4th Semester)

030010412: DSE5 Introduction to Computer Networks

Teaching Schedule

Objectives: To provide thorough understanding of computer network concepts, knowledge of physical & data link layer functionalities and LAN - WAN concepts.

Course Outcomes: Upon completion of the course, students shall be able to
CO1: Summarize about Data Communication, Network architecture, Protocols and Standards.
CO2: Recognize Data Transmission Techniques and Transmission Media.
CO3: Demonstrate Error Detection and Error Correction Methods.
CO4: Describe the functionality of Data Link Layer Protocols for Flow Control and Error Control.
CO5: Describe the functionalities of Network Topologies and Network Components.
CO6: Describe the functionalities of Ethernet Standards 802.3
CO7: Summarize Wide Area Network and Wireless LAN.

Unit	Sub Unit	No. of Lecture(s)	Topics	Reference Chapter/Additional Reading	Teaching Methodology to be used	Evaluation Parameters
1	**Introduction to Data Communication, Networks and Standards :(Total Hours:8 hours)**					
1	1.1	1	Data Communication, Communication systems, Applications	(BS)#1-Page No.1-4 (AT)#1-Page No.1-9 (BF)#1-Page No.3-6	Chalk and talk and PowerPoint Presentation	Quiz
	1.2	2	Network Topologies and Categories of Networks: LAN, MAN, WAN	(BS)#1-Page No.4-10 (BF)#1-Page No.7-13	Discussion + PowerPoint Presentation + Chalk and Talk	
	1.3	2	Network Hardware: Network Interface Card, Repeater, Hub, Bridge, Router, Brouter, Switches, Gateways	(BS)#1-Page No.11-13 (AT)#1-Page No.14-26 (BF)#1-Page No.13-16	Discussion + PowerPoint Presentation + Demonstration of devices.	
	1.4	2	Network Architecture, Open Systems and OSI Model: Layers of OSI model, Functionalities of each layers	(BS)#1-Page No.17-21 (AT)#1-Page No.37-41 (BF)#1-Page No.27-42	Discussion + Presentation + MOOC video	

	1.5	1	Protocols, Standards and Standard Organizations	(BS)#1-Page No.13-17 (AT)#1-Page No.71-76 (BF)#1-Page No.19-21	Discussion + PowerPoint Presentation	
2	**Data Transmission and Communication Media:(Total Hours:10 hours)**					
	2.1	1	Analog and Digital Data Transmission: Analog and Digital signals	(BS)#2-Page No.36-40 (AT)#2-Page No.86-89 (BF)#3-Page No.57-85	Discussion + Chalk &Talk + PowerPoint Presentation	
	2.2	1	Modulation and Demodulation: Analog to Digital Conversion and Digital to Analog Conversion	(BS)#2-Page No.40-44	Discussion + PowerPoint Presentation	
	2.3	2	Transmission Media: Twisted Pair, Coaxial cable, Optical Fibre	(BS)#2-Page No.44-49 (AT)#2-Page No.91-100 (BF)#7-Page No.191-203	Discussion + PowerPoint Presentation +Video (MOOC/Animated video)	
	2.4	2	Wireless Communication: Radio Waves, Microwaves, Infrared	(BS)#2-Page No.49-53 (AT)#2-Page No.100-107 (BF)#7-Page No.203-208	Discussion + PowerPoint Presentation	
	2.5	1	Data Transmission: Parallel, Serial Transmission	(BS)#2-Page No.53-56 (BF)#4-Page No.131-135	PowerPoint Presentation + Chalk & Talk	
	2.6	1	Interfacing, Multiplexing: FDM, TDM and WDM	(BS)#2-Page No.56-59 (BS)#2-Page No.59-62 (BF)#6-Page No.161-170	PowerPoint Presentation + Chalk and talk	

	2.7	2	Switching: Circuit, Message and Packet		Discussion + PowerPoint Presentation	
3	**Error Detection and Correction:(Total Hours:6 hours)**					
	3.1	1	Types of Error, Redundancy, Detection Versus Correction, Forward Error Correction Versus Retransmission	(BS)#3-Page No.64-65 (AT)#3-Page No.192-196 (BF)#10-Page No.267-271	Chalk &Talk + PowerPoint Presentation	Unit Test -1
	3.2	3	Error Detection Methods: Parity Check, Cyclic Redundancy Check, Checksum	(BS)#3-Page No.65-72 (AT)#3-Page No.196-200 (BF)#10-Page No.277-280,284-301	Chalk &Talk + Hands-on practise	
	3.3	2	Error Correction: Hamming code	(BS)#3-Page No.72-76 (AT)#3-Page No.191-195 (BF)#10-Page No.280-284	Chalk &Talk Hands-on practise + PowerPoint Presentation	
4	**Data Link Control and Protocol (Total Hours:8 hours)**					
	4.1	2	Types of Framing: Fixed-Size Framing, Variable-Size Framing	(BF)#11- Page 294 – 296	Discussion + PowerPoint Presentation	Open Book Test
	4.2	2	Data Link Control Functions: Flow Control and Error Control	(BS)#5-Page No.88 (AT)#3-Page No.204-208 (BF)#11-Page No.315-317	Discussion + PowerPoint Presentation	
	4.3	2	Flow Control Protocols: Stop-and- Wait, Sliding Window	(BS) #5- Page No. 89.	Discussion + Chalk &Talk	
	4.4	2	Error Control Protocols: Stop-and- Wait ARQ, Go-Back-N ARQ,	(BS)#5-Page No.91-96 (AT)#3-Page No.208-228	Discussion + Chalk & Talk + Video	

			Selective Reject ARQ, Piggybacking	(BF)#11-Page No.3189-280,284-339		
5	**Medium Access Control SubLayer:(Total Hours:10 hours)**					
	5.1	1	The Channel Allocation Problem	(BS)#6-Page No.110-119 (BF)#13-Page No.445-455	Discussion + PowerPoint Presentation	Unit Test -2
	5.2	3	Multiple Access Protocols: ALOHA, CSMA, CSMA/CD, CSMA/CA	(BS)#6-Page No.120-122,125-126 (AT)#4-Page No.255-258 (BF)#12-Page No. 370-376	Discussion + Chalk & Talk + MOOC Video	
	5.3	3	Token Bus, Token Ring, FDDI, DQDB, LAN Operating System and Protocols	(BS)#6-Page No.126-132	Discussion + Chalk &Talk	
	5.4	3	Ethernet: IEEE Standard and Comparison of Ethernet Technologies	(BS)#6-Page No.132-135 (AT)#4-Page No.271-275,283-289 (BF)#13-Page No. 402-416	Discussion + PowerPoint Presentation	
6	**Wide Area Network and Wireless LAN's:(Total Hours:6 hours)**					
	6.1	2	WAN, Transmission Methods: Time Division Multiple Access, Frequency Division Multiple Access, Statistical Multiple Access.	(BS)#7-Page No.137-142 (BF)#13-Page No. 383-385	Discussion + PowerPoint Presentation	Internal Examination
	6.2	2	WAN Carrier Types: Point to Point, T-carrier, SONET, ISDN, Wireless	(BS)#7-Page No.142-146	Discussion + PowerPoint Presentation	
	6.3	1	Wireless LAN, Configuration and Technology	(BS)#7-Page No.177-185	Discussion + PowerPoint Presentation	
	6.4	1	Wireless LAN	(BS)#7-Page No.185-186	Discussion + PowerPoint	

			Applications		Presentation	

Course objectives and Course outcomes mapping:

- To provide knowledge of Computer Networks Concepts: CO1.
- To provide Knowledge of Physical and Data Link Layer functionalities: CO1, CO2, CO3, CO4.
- To explore LAN-WAN Concepts: CO1, CO5, CO6, CO7.

Course units and Course outcomes mapping:

Unit No.	Unit	Course outcome						
		CO1	CO2	CO3	CO4	CO5	CO6	CO7
1	Introduction to Data Communication, Networks and Standards	✓						
2	Data Transmission and Communication Media	✓	✓					
3	Error Detection and Correction	✓		✓				
4	Data Link Control and Protocols	✓			✓			
5	Medium Access Control Sublayer	✓				✓	✓	
6	Wide Area Network & Wireless LAN's	✓						✓

Programme Outcomes:

PO1: Ability to understand the concepts of key areas in computer science.

PO2: Ability to design and develop system, component or process as well as test and maintain it so as to provide promising solutions to industry and society.

PO3: Effective communication and presentation skill.

PO4: Ability to understand professional and ethical responsibility.

PO5: Recognition of the need for life-long learning.

Course Outcomes and Program Outcome Mapping:

Course Outcomes	Program outcome				
	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓			✓
CO2			✓	✓	
CO3	✓				

CO4	✓				
CO5		✓			✓
CO6		✓			✓

Modes of Transaction (Delivery):

Various methods of teaching should be employed depending on the objectives of the content.

Unit No	Topic Detail	Teaching Approach	P0 mapped
1	Network Topologies and Categories of Networks: LAN, MAN, WAN	Group discussion (Students will be divided into two groups and discussion on topic.)	PO1, PO2
2	Error Correction: Hamming code	Open book study and Hands-on activity	PO1, PO3
3	Ethernet: IEEE Standard and Comparison of Ethernet Technologies	Self-Study	PO4, PO5

Activities/Practicum:

The following activities shall be carried out by the students.

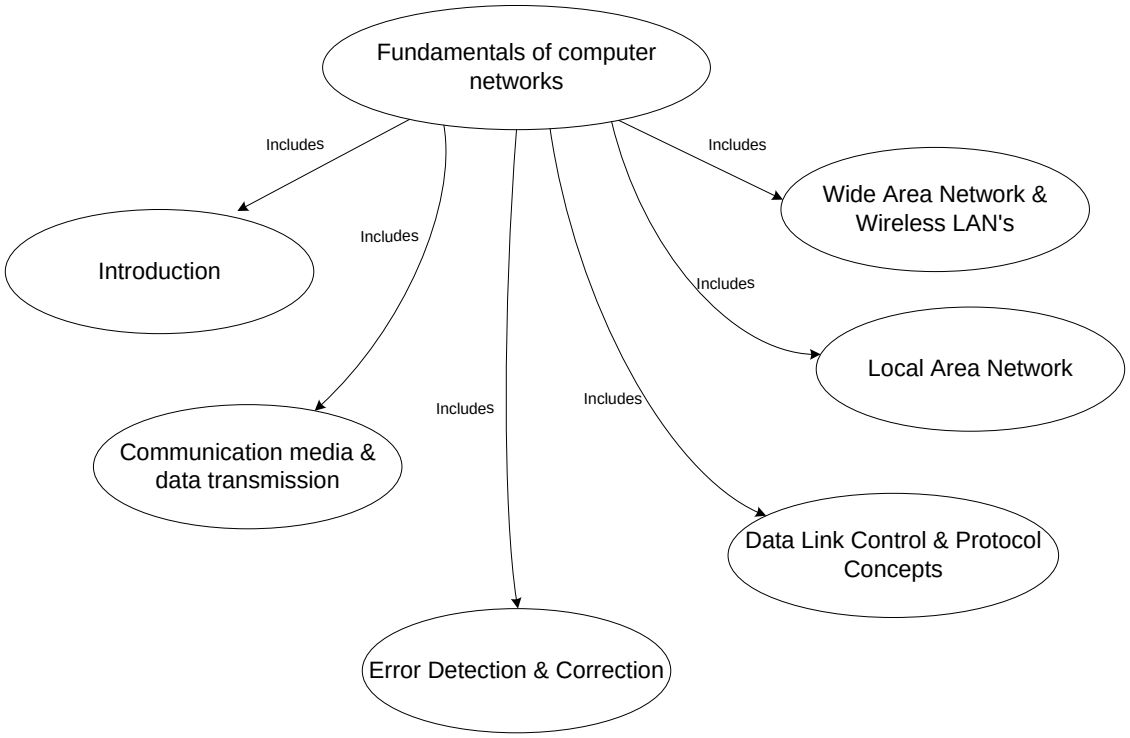
1. Identify Topologies and Network Architectures including all types of hardware in campus.
2. Under the guidance of teacher students may form a small wired network once demonstrated by teacher.
3. Make a simple pair of nodes and make communication between two nodes on NS2 tool.

The following activities shall be carried out by the teacher.

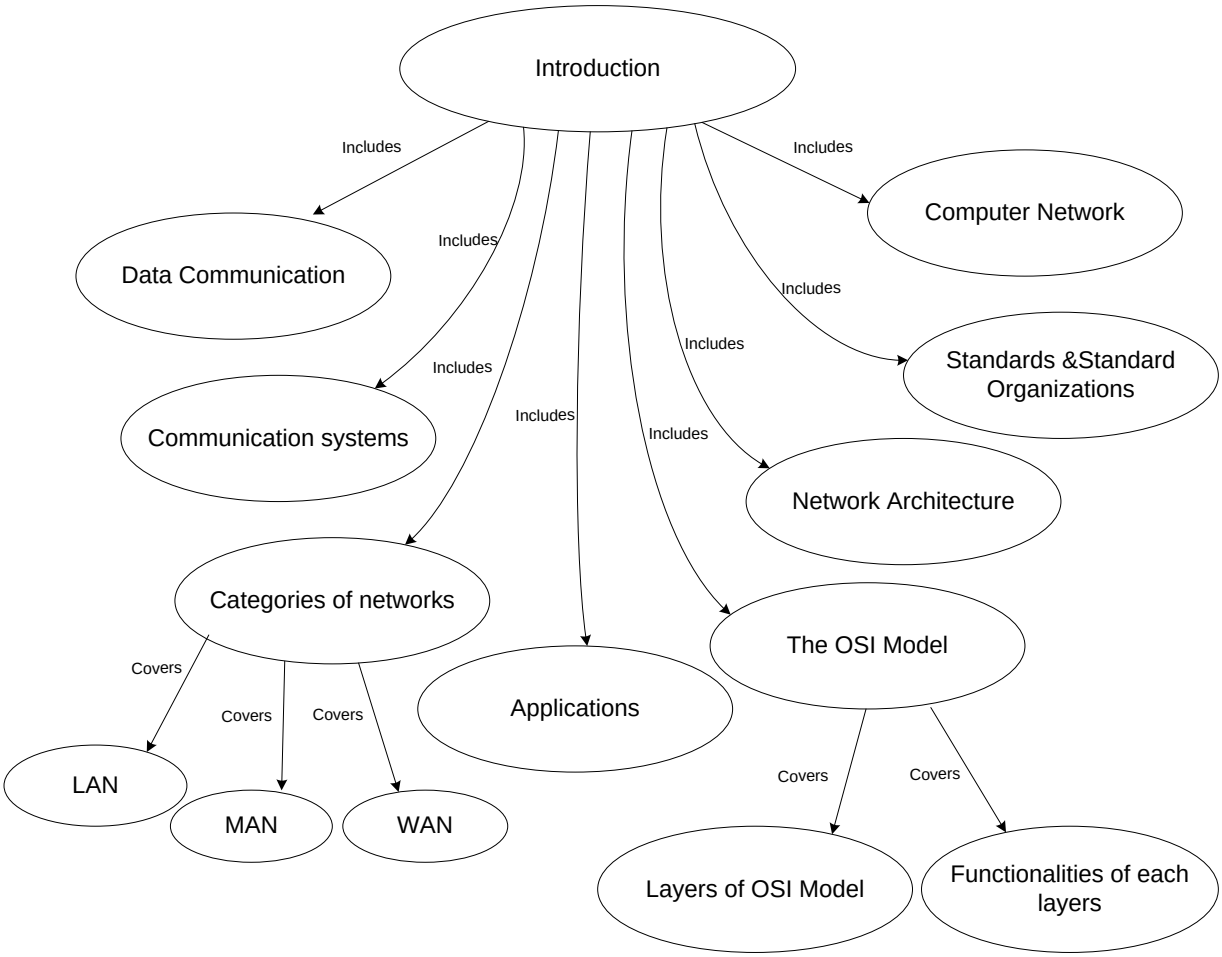
Demonstration of various networking devices, Crimping of wires, installing NIC drivers and show some of the networks device.

Learner	Activities to be done	P0 mapped
For slow learners	Question and answer after completion of each unit.	PO4
For advanced learners	Give a various scenario and identify network category	PO4, PO5
For all	Group Discussion of recent trends in computer network. Demonstrate a network hardware.	PO3, PO4

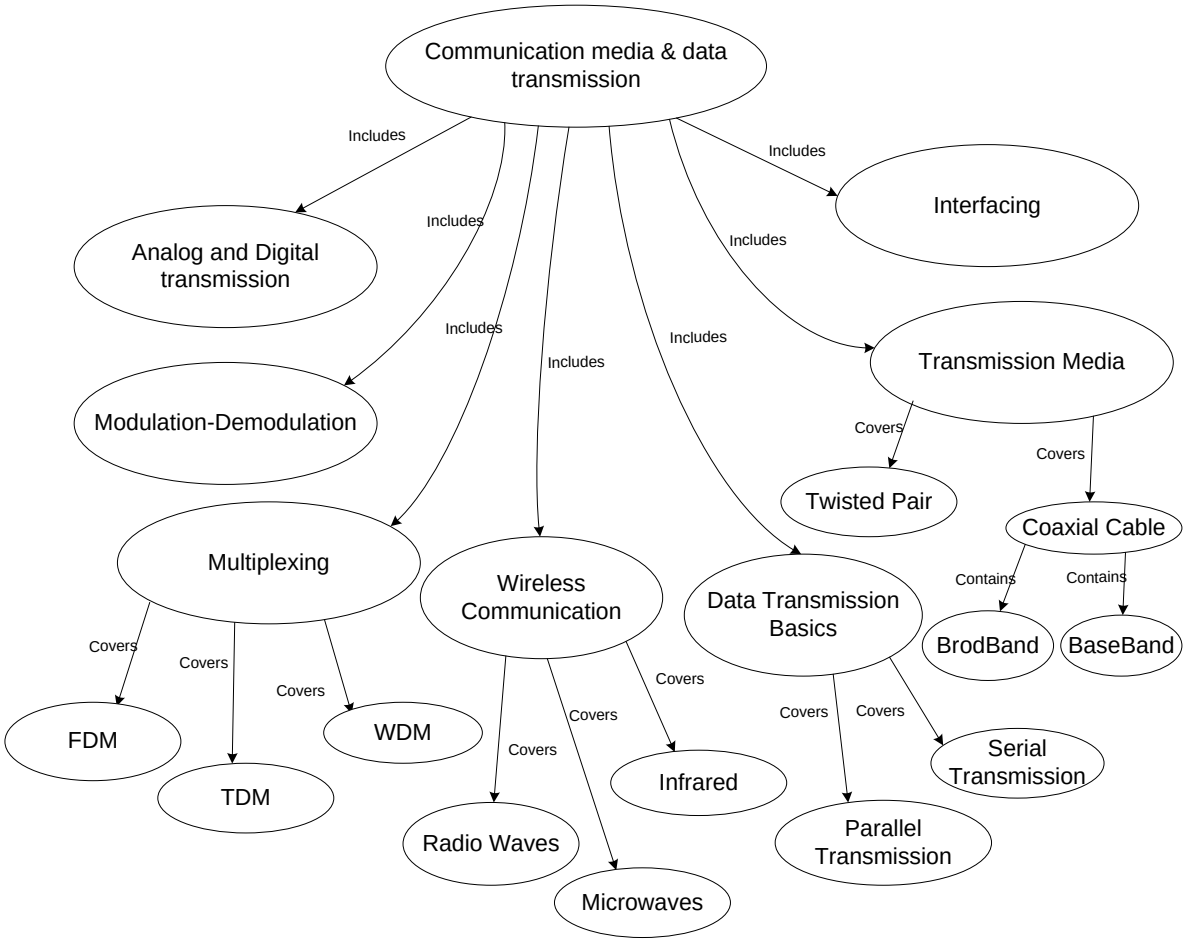
Concept map:
Course: Introduction to computer Network



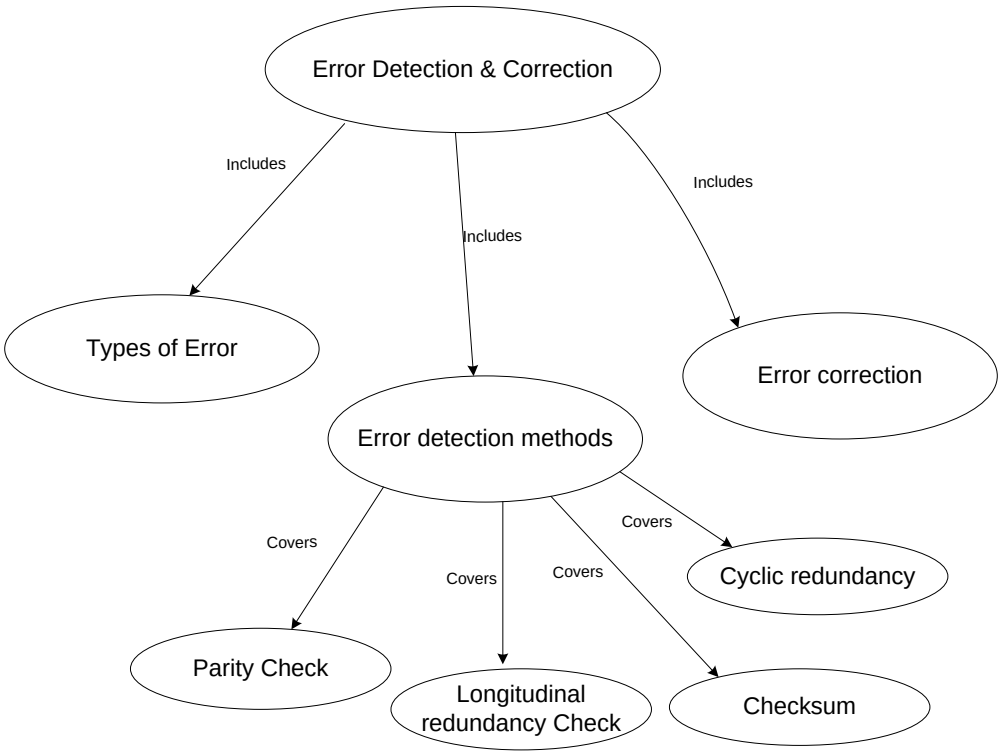
Unit 1


Introduction
Includes
Includes
Includes
Includes
Includes
Includes
Includes
Includes
Data Communication
Computer Network
Standards &Standard Organizations
Communication systems
Network Architecture
Categories of networks
The OSI Model
Applications
Covers
Covers
Covers
Covers
Covers
LAN
MAN
WAN
Layers of OSI Model
Functionalities of each layers

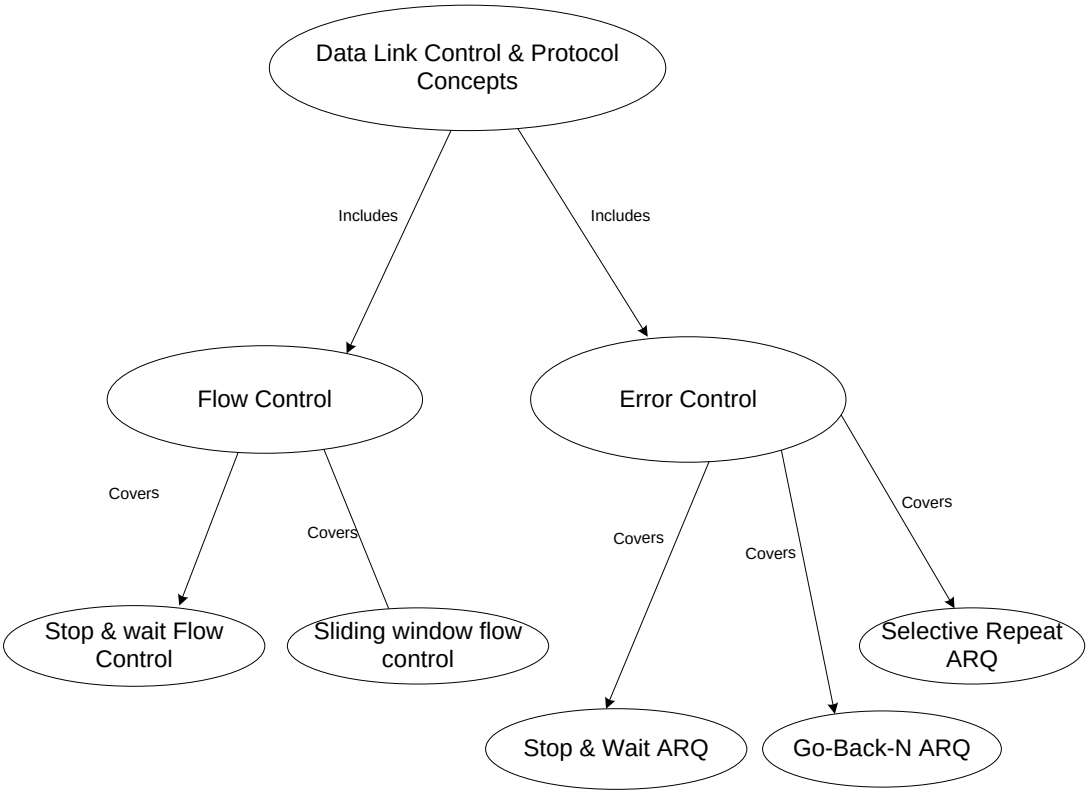
Unit 2


Communication media & data transmission
Includes
Includes
Includes
Includes
Includes
Includes
Analog and Digital transmission
Interfacing
Modulation-Demodulation
Transmission Media
Multiplexing
Wireless Communication
Data Transmission Basics
Covers
Covers
Covers
Twisted Pair
Coaxial Cable
Contains
Contains
BrodBand
BaseBand
Covers
Covers
Covers
FDM
TDM
WDM
Covers
Covers
Covers
Infrared
Radio Waves
Microwaves
Covers
Covers
Serial Transmission
Parallel Transmission

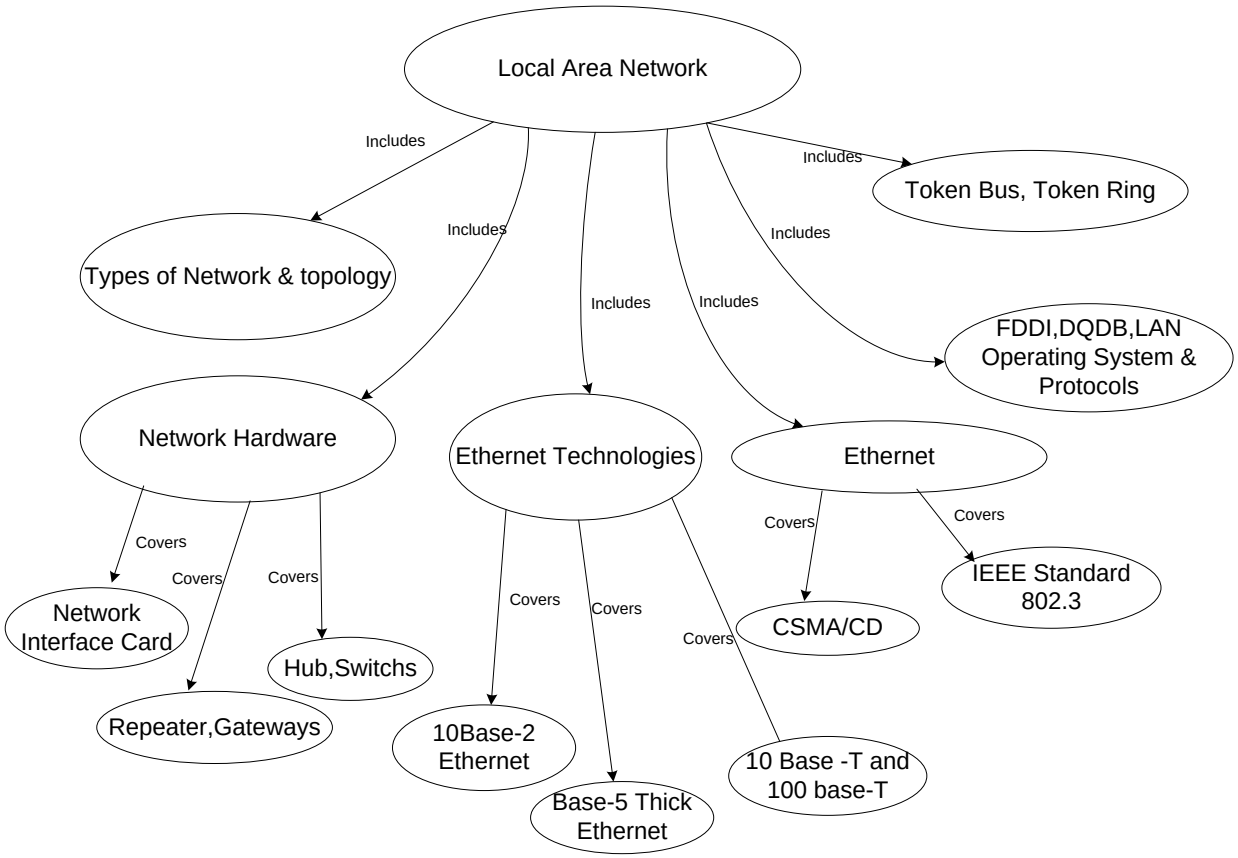
Unit 3


Error Detection & Correction
Includes
Includes
Includes
Types of Error
Error detection methods
Error correction
Covers
Covers
Covers
Covers
Cyclic redundancy
Parity Check
Longitudinal redundancy Check
Checksum

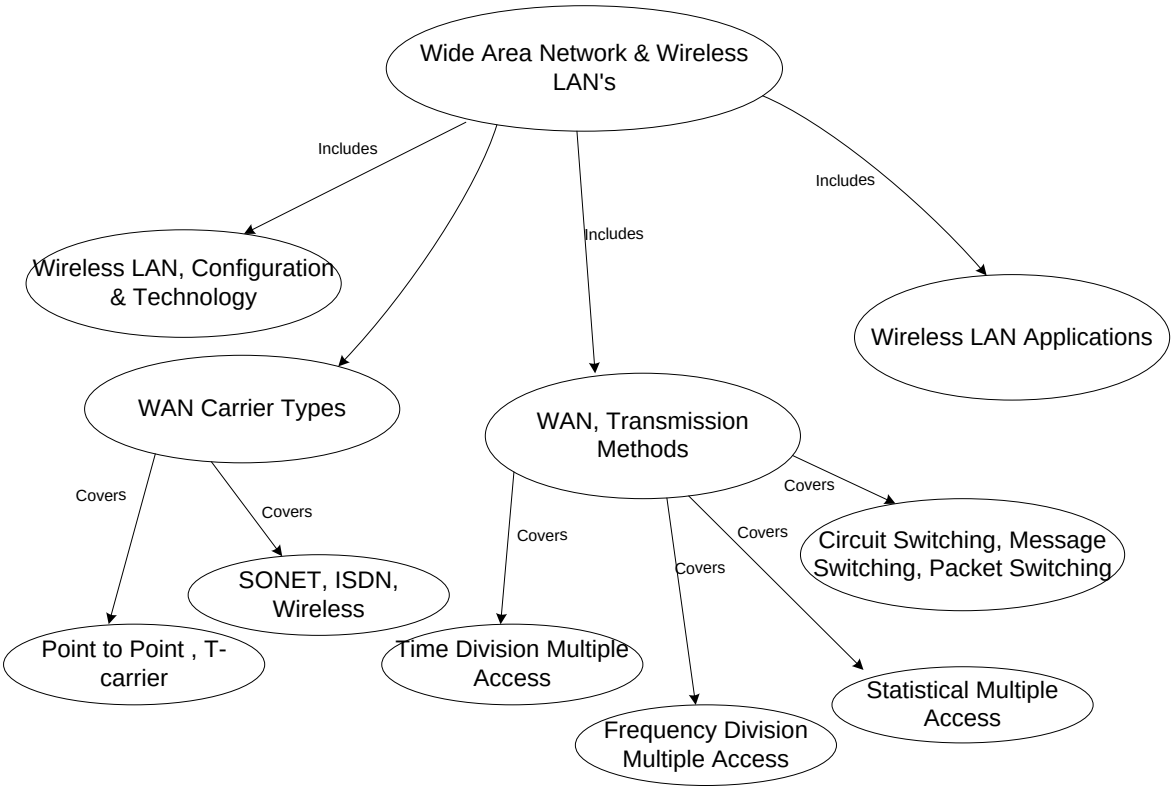
Unit 4


Data Link Control & Protocol Concepts
Includes
Includes
Flow Control
Error Control
Covers
Covers
Covers
Covers
Covers
Stop & wait Flow Control
Sliding window flow control
Stop & Wait ARQ
Go-Back-N ARQ
Selective Repeat ARQ

Unit 5


Local Area Network
Includes
Includes
Includes
Includes
Includes
Includes
Token Bus, Token Ring
Types of Network & topology
FDDI,DQDB,LAN Operating System & Protocols
Network Hardware
Ethernet Technologies
Ethernet
Covers
Covers
Covers
Covers
Covers
Covers
Covers
Covers
Network Interface Card
Hub,Switchs
Repeater,Gateways
10Base-2 Ethernet
Base-5 Thick Ethernet
10 Base -T and 100 base-T
CSMA/CD
IEEE Standard 802.3

Unit 6


Wide Area Network & Wireless LAN's
Includes
Includes
Includes
Includes
Wireless LAN, Configuration & Technology
Wireless LAN Applications
WAN Carrier Types
WAN, Transmission Methods
Covers
Covers
Covers
Covers
Covers
Covers
Circuit Switching, Message Switching, Packet Switching
SONET, ISDN, Wireless
Point to Point , T-carrier
Time Division Multiple Access
Statistical Multiple Access
Frequency Division Multiple Access