

EE 4301 - Communications Systems 1

Lecture 1

Dr. C.K.W.Seneviratne

Department of Electrical and Information Engineering,

University of Ruhuna

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Module Aim

- The aim is to teach the fundamentals of modulation and demodulation processes of analogue and digital communication systems.

What we are going to study?

- Introduction to Communication Systems
- Amplitude Modulation and Demodulation
- Bandwidth Efficiency and Power Efficiency
- Angle Modulation and Demodulation
- Pulse Modulation
- Baseband Pulse Transmission
- Passband Data Transmission

Module Components

Section	Day	Start time	Duration	Location
Lecture	Monday	8.30 AM	120 (min)	DO1
Lecture	Wednesday	10.30 AM	60 (min)	LT2

- 4 x Lab Sessions
 - LAB 1 : AM Modulation
 - LAB 2 : FM Modulation
 - LAB 3 : Digital Carrier Wave Modulation(ASK,FSK,PSK)
 - LAB 4 : Pulse Code Modulation
- 2 x In class Tests
- 2 x In class Assignment
- End Semester Exam

Evaluations

Component	Weight
4 x Lab Sessions	20%
2 x In class Tests	20%
2 x In class Assignment	10%
End Semester Exam	50%

Eligibility to appear for the end semester evaluation

- Minimum of 80% attendance for theory class
- Completion of all laboratory sessions

Necessary condition to pass the module

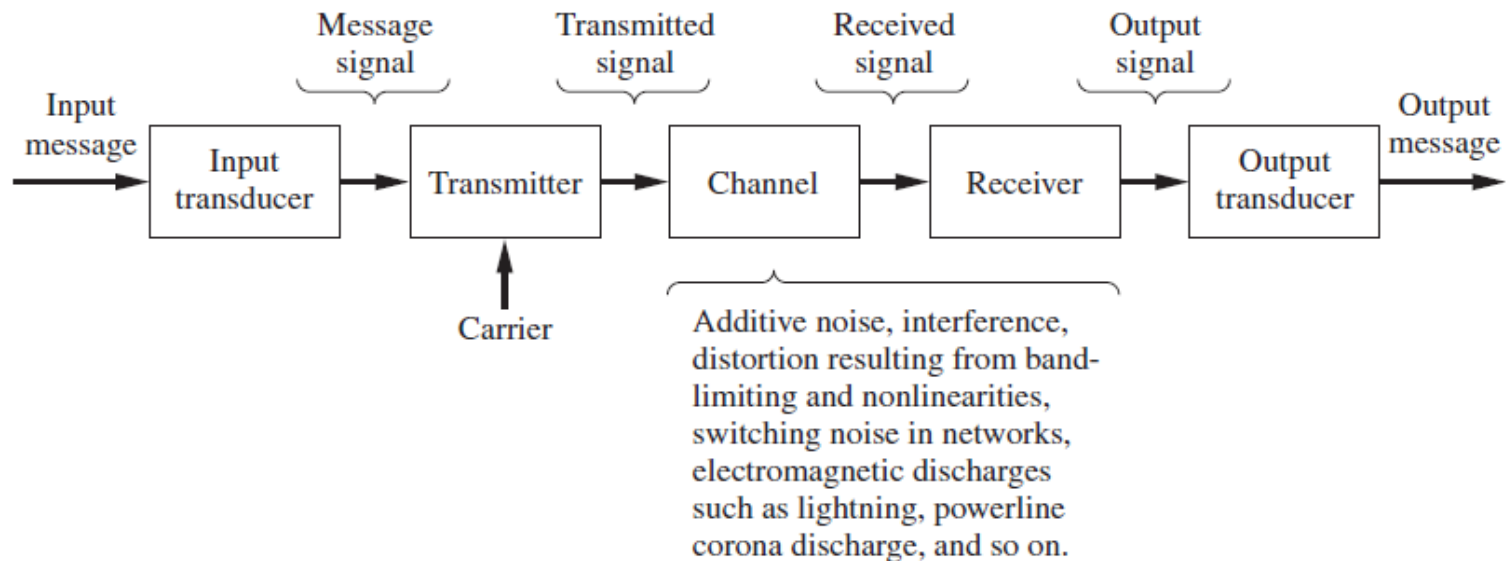
- 35% marks in continuous assessments
- 35% marks in final evaluation
- 40% marks in overall marks

Suggested Books

- Bruce A. Carlson, Paul B. Crilly, Janet C. Rutledge: Communication Systems: An Introduction to Signals and Noise in Electrical Communication; McGraw-Hil, 2002; ISBN: 0-0712-1028-8.
- B.P. Lathi: Modern Digital and Analog Communication Systems Engineering; Oxford University Press, 1998; ISBN: 0-1951-1009-9.
- Simon Haykin: Communication Systems; John Wiley, 2002; ISBN: 0-0712-1028-8. U.A. Bakshi and A.V. Bakshi, Circuit Theory, Technical Publications, 2009, ISBN 81-843-1527-9.
- T.S.K.V. Iyer, Circuit Theory, Tata McGraw-Hill Education, 1985, ISBN 0-07-451681-7

Introduction to Communication Systems

- A communication system conveys information from its source to a destination some distance away. A typical communication system can be represented as below.



Block diagram of a communication system.

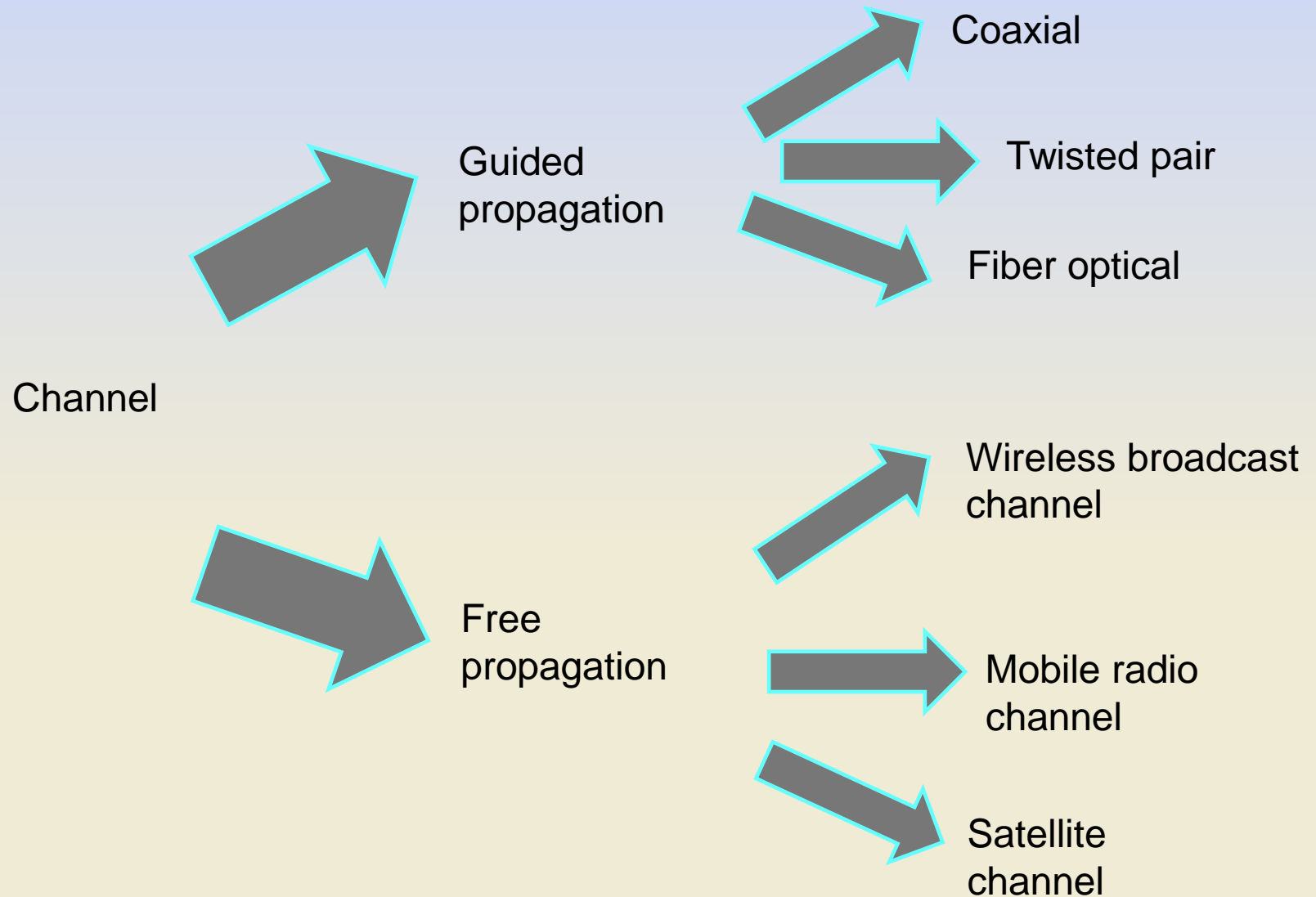
Introduction to Communication Systems

- **Information Source** : Generate a message. This message can be either analog message or digital message.
 - Human voice
 - Video
 - Picture
- **Input transducer** : Converts the message to an electrical signal. This signal referred as a baseband signal. The frequencies of baseband signals are concentrated near $f=0$.
 - Microphone : converts acoustic signal to a voltage signal
 - Camera : converts image to voltage/current signal

Introduction to Communication Systems

- **Transmitter** : Adjust the baseband signal for efficient transmission over the channel. The necessary adjustments are determined by the input signal, the type of the communication system and the channel.
 - In a analog communication system, transmitter consists of components such as analog low pass filters, modulator, amplifiers
 - In a digital communication system, transmitter consists of components such as a sampler, quantizer, coder and a modulator
- **Channel** : Physical media use for signal transmission. Various unwanted undesirable effects occur when signals transmit over the channel. They are
 - reduction of signal strength (eg. attenuation)
 - alternation of signal shape (eg. distortion, interference, noise)

Introduction to Communication Systems



Introduction to Communication Systems

- **Receiver** : Accepts the distorted signal and performs its recovery. It undo whatever the modification done by transmitter or channel to the original signal.
 - Demodulators, amplifiers, filters, decoders
- **Output transducer** : Convert the signal into native form.
 - Speakers
 - Screen
- **Information Sink** : Final destination that receives message
 - Voice
 - Received video
 - Picture