Grade 12 A/L ICT · Lesson 6

6.4 PSTN, Modems and Modulation

Syllabus 6.4. The **PSTN** provides an **analog voice** circuit between two points. **Modems modulate** digital data onto analog signals and **demodulate** them at the far end so two computers can talk over a phone line.

1. What is the PSTN?

The **Public Switched Telephone Network** connects phones through switches. Classically it carries **analog voice** between two points once a circuit is set up.

2. Modems

A **modem** (**mo**dulator–**dem**odulator) turns bits into analog tones (modulation) and back (demodulation) so digital devices can use the analog line.

Two PCs linked by modems over PSTN



PC–modem–PSTN–modem–PC

💡 Draw: PC A → Modem → PSTN cloud → Modem → PC B.

🧱 **Worked example: A 4 kHz voice band is modulated onto a carrier so bits ride the analog PSTN loop; the far modem demodulates back to bits.**
Modem = modulator + demodulator for analog lines.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* Today many "phone lines" are digital (VoIP), but the exam story of modem over analog PSTN remains.

Key Words

PSTN – Public Switched Telephone Network.

Analog voice circuit – Path that carries voice-band analog signals.

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Modulation – Imprinting data onto an analog carrier.	**Demodulation** – Recovering data from the analog signal.
Modem – Modulator–demodulator device.	**Carrier** – Analog wave that is modulated.
Dial-up – Connecting via ordinary phone call.	**Remote device** – Device reached over the PSTN path.
Switch – Telephone exchange switching element.	**Voice band** – Frequencies used for telephony audio.
Digital data – Bits from the computer.	**Schematic** – Block diagram of the link.

Sample Q&A

1. What does PSTN stand for?

> **Answer:** Public Switched Telephone Network.

2. What does a modem do?

> **Answer:** Modulates and demodulates between digital and analog.

3. Why modulate?

> **Answer:** To send digital data on an analog voice line.

4. Draw the five blocks of a modem link.

> **Answer:** PC–modem–PSTN–modem–PC.

5. Is classic PSTN voice analog or digital?

> **Answer:** Analog voice circuit.

6. Demodulation recovers?

> **Answer:** The original digital data.

MCQ

1. PSTN classically carries

A. only fiber colours
B. only USB power
C. analog voice
D. only MAC frames
E. only IP packets always

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2. Modem means

A. modulator–demodulator
B. memory only
C. monitor only
D. mouse only
E. magnet only

3. Modulation puts data on

A. a wooden desk
B. a shoe
C. a paper form
D. a lunch tray
E. an analog carrier

4. Link order is

A. switch–switch only
B. PC–modem–PSTN–modem–PC
C. DNS–DNS
D. PC–PC only
E. modem–modem with no line

5. Demodulation happens

A. only in the GPU
B. only in the speaker
C. at the receiving modem
D. only in the keyboard
E. only in the fan

6. A switched network can

A. invent parity
B. remove all clocks
C. delete gravity
D. set up a path between two subscribers
E. paint fiber blue

7. Digital PCs need modems on PSTN because

A. MAC needs tea
B. OSI bans layer 1
C. PCs dislike copper
D. the classic line expects analog voice-band signals
E. IP forbids phones

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8. Schematic diagrams should show

A. only one PC
B. both modems and the PSTN in between
C. only printers
D. only icons
E. only games

9. Which term means: “Public Switched Telephone Network”?

A. Carrier
B. Modulation
C. Digital data
D. Remote device
E. PSTN

10. Which term means: “Path that carries voice-band analog signals”?

A. Analog voice circuit
B. Dial-up
C. Demodulation
D. Switch
E. Schematic

11. Which term means: “Imprinting data onto an analog carrier”?

A. Voice band
B. Modulation
C. Modem
D. PSTN
E. Remote device

12. Which term means: “Recovering data from the analog signal”?

A. Digital data
B. Switch
C. Demodulation
D. Carrier
E. Analog voice circuit

13. Which term means: “Modulator–demodulator device”?

A. Dial-up
B. Voice band
C. Schematic
D. Modulation
E. Modem

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14. Which term means: “Analog wave that is modulated”?

A. Carrier
B. Digital data
C. PSTN
D. Demodulation
E. Remote device

15. Which term means: “Connecting via ordinary phone call”?

A. Schematic
B. Modem
C. Analog voice circuit
D. Dial-up
E. Switch

16. Which term means: “Device reached over the PSTN path”?

A. PSTN
B. Voice band
C. Carrier
D. Remote device
E. Modulation

17. Which term means: “Telephone exchange switching element”?

A. Digital data
B. Dial-up
C. Analog voice circuit
D. Demodulation
E. Switch

18. Which term means: “Frequencies used for telephony audio”?

A. Modem
B. Voice band
C. Modulation
D. Remote device
E. Schematic

19. Which term means: “Bits from the computer”?

A. Switch
B. Carrier
C. Digital data
D. PSTN
E. Demodulation

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20. Which term means: “Block diagram of the link”?

A. Schematic
B. Dial-up
C. Analog voice circuit
D. Modem
E. Voice band

Structured Questions

1. Define PSTN. *(2 marks)*

> Public network providing switched voice circuits.

2. Explain modulation and demodulation. *(2 marks)*

> Encode bits on analog; recover bits from analog.

3. Role of a modem. *(2 marks)*

> Does both modulation and demodulation.

4. Sketch PC–modem–PSTN–modem–PC. *(2 marks)*

> Five labelled blocks in order.

5. Why not send raw digital levels on classic PSTN? *(2 marks)*

> Line designed for analog voice-band signals.

Summary

- PSTN = switched analog voice network.
- Modems bridge digital and analog.
- Modulation / demodulation pair.
- Draw the five-block schematic.
- Circuit connects two remote devices.

MCQ answer key – 6.4

1. **C** – Analog voice.
2. **A** – Mod/demod.
3. **E** – Analog carrier.
4. **B** – Via PSTN.
5. **C** – Receive modem.
6. **D** – Path between users.
7. **D** – Analog line.

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8. **B** – Full path.
9. **E** – PSTN – Public Switched Telephone Network.
10. **A** – Analog voice circuit – Path that carries voice-band analog signals.
11. **B** – Modulation – Imprinting data onto an analog carrier.
12. **C** – Demodulation – Recovering data from the analog signal.
13. **E** – Modem – Modulator–demodulator device.
14. **A** – Carrier – Analog wave that is modulated.
15. **D** – Dial-up – Connecting via ordinary phone call.
16. **D** – Remote device – Device reached over the PSTN path.
17. **E** – Switch – Telephone exchange switching element.
18. **B** – Voice band – Frequencies used for telephony audio.
19. **C** – Digital data – Bits from the computer.
20. **A** – Schematic – Block diagram of the link.

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