Grade 12 A/L ICT · Lesson 6

6.12 ISPs, Home Networks and NAT

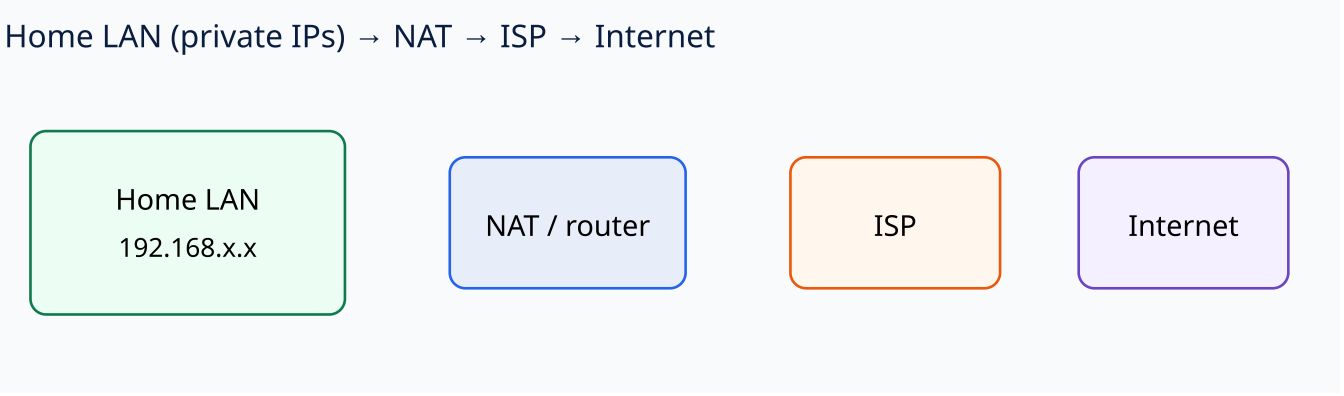
Syllabus 6.12. An **ISP** connects you to the Internet. Homes use **modems** and **DSL/ADSL**, often a **private-IP LAN** with **NAT** (and sometimes **proxies**) so many devices share one public address.

1. ISP role

An **Internet Service Provider** gives connectivity, often with a public IP (or CGNAT) and DNS defaults.

2. Connecting home

Dial-up modems used phone lines; **DSL/ADSL** send data at higher speed on the same copper with voice filters – always-on and faster than dial-up.



Home LAN → NAT → ISP → Internet

3. NAT and proxies

NAT translates many private addresses to one (or few) public addresses. A **proxy** can forward/filter application requests on behalf of clients.

🧱 **Worked example: LAN 192.168.1.0/24 behind one public WAN IP. NAT rewrites private sources so many hosts share one public address.**
NAT hides private addresses; ISP routes the public IP.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* Fiber ONTs replaced many ADSL boxes; NAT ideas remain.

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Key Words

ISP – Internet Service Provider.	**Modem** – Modulates for the access link.
DSL / ADSL – Digital Subscriber Line family.	**Dial-up** – Internet via telephone call.
Home LAN – Private network at home.	**NAT** – Network Address Translation.
Proxy – Intermediate request forwarder.	**Private IP** – Address used inside the LAN.
Public IP – Globally routable address.	**Always-on** – Link stays connected (DSL).
Customer router – Home gateway doing NAT/Wi-Fi.	**Access network** – Link from home to ISP.

Sample Q&A

1. What is an ISP?

> **Answer:** Organisation that connects customers to the Internet.

2. ADSL advantage over dial-up?

> **Answer:** Faster, always-on, can share line with voice.

3. NAT role?

> **Answer:** Maps private LAN IPs to public IP(s).

4. Proxy role?

> **Answer:** Forwards/filters client requests.

5. Why private IPs at home?

> **Answer:** Many devices share scarce public addresses via NAT.

6. Modem on access link?

> **Answer:** Fits digital data to the ISP access technology.

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MCQ

1. An ISP provides

A. Internet connectivity
B. only paint
C. only pencils
D. only chairs
E. only lunch

2. ADSL is typically

A. only USB power
B. faster and always-on vs dial-up
C. slower than smoke signals
D. only satellite paint
E. only parity

3. NAT translates

A. private addresses to public
B. chairs to desks
C. songs to notes
D. tea to coffee only
E. fonts to colours

4. A home LAN often uses

A. only DNS as IP
B. only HTTP as IP
C. only public IPv4 for every bulb
D. private IP addresses
E. only MAC as IP

5. A proxy can

A. forward or filter application requests
B. grow fiber trees
C. iron cables
D. boil switches
E. invent gravity

6. Dial-up uses

A. only DisplayPort
B. only HDMI
C. only Wi-Fi mist
D. only VGA
E. a telephone call path

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7. Many devices share one public IP using

A. only ALOHA fruit
B. only bus paint
C. only hubs without cables
D. NAT
E. only parity

8. The path home→Internet is

A. MAC → tea → proxy
B. Internet → lunch → LAN
C. GPU → fan → ISP
D. DNS → chair → modem
E. LAN → NAT/router → ISP → Internet

9. Which term means: “Internet Service Provider”?

A. Customer router
B. NAT
C. ISP
D. Private IP
E. DSL / ADSL

10. Which term means: “Modulates for the access link”?

A. Access network
B. Modem
C. Public IP
D. Proxy
E. Dial-up

11. Which term means: “Digital Subscriber Line family”?

A. Private IP
B. Home LAN
C. DSL / ADSL
D. ISP
E. Always-on

12. Which term means: “Internet via telephone call”?

A. Modem
B. Public IP
C. NAT
D. Customer router
E. Dial-up

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13. Which term means: “Private network at home”?

A. Always-on
B. Home LAN
C. Proxy
D. DSL / ADSL
E. Access network

14. Which term means: “Network Address Translation”?

A. Private IP
B. NAT
C. Dial-up
D. Customer router
E. ISP

15. Which term means: “Intermediate request forwarder”?

A. Access network
B. Public IP
C. Home LAN
D. Proxy
E. Modem

16. Which term means: “Address used inside the LAN”?

A. Private IP
B. Always-on
C. DSL / ADSL
D. NAT
E. ISP

17. Which term means: “Globally routable address”?

A. Customer router
B. Dial-up
C. Public IP
D. Modem
E. Proxy

18. Which term means: “Link stays connected (DSL)”?

A. Private IP
B. Home LAN
C. Access network
D. DSL / ADSL
E. Always-on

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19. Which term means: “Home gateway doing NAT/Wi-Fi”?

A. Public IP
B. ISP
C. Customer router
D. Dial-up
E. NAT

20. Which term means: “Link from home to ISP”?

A. Home LAN
B. Proxy
C. Always-on
D. Access network
E. Modem

Structured Questions

1. Role of an ISP. *(2 marks)*

> Connects customers to the wider Internet.

2. Modems and dial-up vs DSL/ADSL. *(2 marks)*

> Dial-up call; DSL faster always-on on copper.

3. Home private LAN + NAT. *(2 marks)*

> Many private hosts share public IP(s).

4. Proxy in a private LAN. *(2 marks)*

> Intermediate forward/filter of requests.

5. Sketch home → ISP → Internet. *(2 marks)*

> LAN, NAT router, ISP, Internet labelled.

Summary

- ISPs provide Internet access.
- DSL/ADSL beat dial-up speed.
- Home LANs use private IPs.
- NAT shares public addresses.
- Proxies can filter/forward apps.

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MCQ answer key – 6.12

1. **A** – Connectivity.
2. **B** – Faster/always-on.
3. **A** – Address translate.
4. **D** – Private IPs.
5. **A** – Forward/filter.
6. **E** – Phone path.
7. **D** – NAT.
8. **E** – Via ISP.
9. **C** – ISP – Internet Service Provider.
10. **B** – Modem – Modulates for the access link.
11. **C** – DSL / ADSL – Digital Subscriber Line family.
12. **E** – Dial-up – Internet via telephone call.
13. **B** – Home LAN – Private network at home.
14. **B** – NAT – Network Address Translation.
15. **D** – Proxy – Intermediate request forwarder.
16. **A** – Private IP – Address used inside the LAN.
17. **C** – Public IP – Globally routable address.
18. **E** – Always-on – Link stays connected (DSL).
19. **C** – Customer router – Home gateway doing NAT/Wi-Fi.
20. **D** – Access network – Link from home to ISP.

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