

# **Network and Security Topics Analysis**

## **Identified Topics from A-Level Papers (2013-2024)**

Based on my analysis of the exam questions, I've identified the following key topics:

- 1. Digital Signatures**
- 2. Client-Server Architecture**
- 3. Protocols (SMTP, HTTPS, IP, etc.)**
- 4. Packet Switching**
- 5. Firewalls**
- 6. Network Security & Authentication**
- 7. Intranet**
- 8. Cloud Computing**
- 9. Routers & Switches**
- 10. DNS (Domain Name System)**
- 11. Network Transmission & Error Detection**
- 12. Network Topologies & Models**
- 13. Data Encoding (UTF-8, ASCII)**
- 14. DoS Attacks**
- 15. Physical & Software Security**

## **Questions Organized by Topic**

Topic	Question	Year, Question Number
<b>Digital Signatures</b>	Explain the purpose of a digital signature	2024 A Level Paper 1, Q6(d)(i)
	Explain how a digital signature is generated and sent to the receiver	2024 A Level Paper 1, Q6(d)(ii)
	Explain how Bob will know that Alice's original document has been intercepted and modified	2024 A Level Paper 1, Q6(e)
	Explain how Jeffrey's network application creates a digital signature	2023 A Level Paper 1, Q5(a)(i)
	Explain how the digital signature is authenticated by Kim's network application	2023 A Level Paper 1, Q5(a)(ii)
	Describe how a digital signature can be used to give confidence that a received message has not been altered	2021 A Level Paper 1, Q3(e)
<b>Client-Server Architecture</b>	Describe the term client-server architecture	2024 A Level Paper 1, Q6(a)
	Explain the meaning of the term client-server model	2016 A Level Paper 2, Q7(f)(i)
	State the two items of software that the LAN will use to implement this client-server design	2016 A Level Paper 2, Q7(f)(ii)
	State where data are stored on a client-server network	2017 A Level Paper 2, Q4(a)(i)
	State where data are stored on a peer-to-peer network	2017 A Level Paper 2, Q4(a)(ii)
	Describe one benefit of a client-server network over a peer-to-peer network	2017 A Level Paper 2, Q4(a)(iii)
	Describe one drawback of a client-server network compared to a peer-to-peer network	2017 A Level Paper 2, Q4(a)(iv)
	Give two advantages in storing shared data on a client-server network rather than on a peer-to-peer network	2019 A Level Paper 2, Q6(d)
<b>Protocols</b>	Explain why networking protocols are required	2024 A Level Paper 1, Q6(c)
	Explain why protocols are required to enable reliable communication over the internet	2022 A Level Paper 1, Q7(b)
	State two reasons why LANs need communication protocols	2020 A Level Paper 1, Q4(a)(ii)

Topic	Question	Year, Question Number
	Explain how requests arriving at this server are handled	2021 A Level Paper 1, Q3(c)
<b>Packet Switching</b>	State the format of an IPv4 address	2023 A Level Paper 1, Q5(b)(i)
	State two ways that a host can be allocated an IP address	2023 A Level Paper 1, Q5(b)(ii)
	Explain what is meant by a packet-switching network	2023 A Level Paper 1, Q5(b)(iii)
	Describe the role of a router in a packet-switching network	2023 A Level Paper 1, Q5(b)(iv)
	Explain why transmitted data is divided into packets	2022 A Level Paper 1, Q7(a)(i)
	Explain why the packets are sequentially numbered	2022 A Level Paper 1, Q7(a)(ii)
	State two items, other than the packet number, that are stored in the packet header	2022 A Level Paper 1, Q7(a)(iii)
	Explain the term packet-switching	2020 A Level Paper 1, Q4(b)(i)
	Describe a disadvantage of packet-switching and how the problem can be handled	2020 A Level Paper 1, Q4(b)(ii)
	State how a packet-switched network can cope with a broken cable on part of the network	2020 A Level Paper 1, Q4(b)(iii)
	Explain how packet switching is used when a web page is downloaded from the Internet	2014 A Level Paper 2, Q4(b)
	Give two advantages of packet switching over circuit switching	2019 A Level Paper 2, Q6(a)(i)
	Give one advantage of circuit switching over packet switching	2019 A Level Paper 2, Q6(a)(ii)
	Explain why circuit switching could be used in this LAN	2014 A Level Paper 2, Q4(a)
<b>Firewalls</b>	Explain how a firewall can provide security to the LAN	2022 A Level Paper 1, Q7(d)
	Explain how the firewall may manage traffic between the server and the internet	2021 A Level Paper 1, Q3(d)

Topic	Question	Year, Question Number
	Describe two ways that a firewall can be used to block unauthorised access to the network	2018 A Level Paper 2, Q4(a)
<b>Network Security &amp; Authentication</b>	State two authentication techniques to limit access to a network application	2021 A Level Paper 1, Q3(f)
	State two methods for ensuring the security of access to the care record network application	2016 A Level Paper 2, Q7(g)(i)
	Give two methods for protecting the security of the LAN	2016 A Level Paper 2, Q7(g)(ii)
	Describe two methods which can be used to ensure that there is no remote access to customer data by management staff	2014 A Level Paper 2, Q1(f)
	State the security feature that can be used when no one other than the intended recipient of the message should be able to read it	2020 A Level Paper 1, Q4(d)(i)
	State the security feature that can be used when the intended recipient must be confident that the message is from the identified sender	2020 A Level Paper 1, Q4(d)(ii)
	Describe two methods that could be used to restrict access to inappropriate websites	2018 A Level Paper 2, Q4(b)
<b>Intranet</b>	Describe the term intranet	2024 A Level Paper 1, Q6(b)
	Describe two benefits that the intranet might provide for students	2018 A Level Paper 2, Q4(d)
<b>Cloud Computing</b>	State two advantages of using cloud computing for webmail service	2013 A Level Paper 2, Q4(a)
	State one disadvantage of using cloud computing for webmail service	2013 A Level Paper 2, Q4(b)
	Describe an example of how employees may use the cloud to work collaboratively	2013 A Level Paper 2, Q4(c)
	Describe how the cloud can be beneficial to the company when developing new software for a client	2013 A Level Paper 2, Q4(d)
<b>Routers &amp; Switches</b>	Explain how the router directs arriving data packets to the correct device on the LAN	2022 A Level Paper 1, Q7(c)
	State which of the pieces of equipment is the switch and explain your answer	2017 A Level Paper 2, Q2(b)

Topic	Question	Year, Question Number
	Describe two features of a router	2017 A Level Paper 2, Q2(c)
	Explain the most significant differences between a switch and a router	2019 A Level Paper 2, Q6(c)
	Explain the purpose of a bridge in a network	2019 A Level Paper 2, Q6(c)
<b>DNS</b>	Describe the actions that would be carried out by the local DNS on receiving this request	2020 A Level Paper 1, Q4(c)
<b>Network Transmission &amp; Error Detection</b>	If the byte 00110101 results in a parity error, state the type of parity being used	2014 A Level Paper 2, Q4(c)
	Explain how the receiving computer uses the checksum byte to check whether the packet contains an error	2014 A Level Paper 2, Q4(d)
	State one reason for using either a parity check or a checksum	2019 A Level Paper 2, Q6(b)(i)
	Give one example of an error that a parity check cannot detect	2019 A Level Paper 2, Q6(b)(ii)
	State which diagram represents asynchronous data transmission and explain your answer	2017 A Level Paper 2, Q2(a)(i)
	Explain why asynchronous data transmission affects network performance	2017 A Level Paper 2, Q2(a)(ii)
	Calculate the transfer rate in megabits per second for a 30 megabyte file transferred in 5 seconds	2017 A Level Paper 2, Q4(c)
	Explain how all print jobs are controlled and sent to the printer	2017 A Level Paper 2, Q4(b)
<b>Network Topologies &amp; Models</b>	State two ways that a particular device can be identified on a LAN	2020 A Level Paper 1, Q4(a)(i)
	Describe three possible uses of the handheld device	2013 A Level Paper 2, Q1(g)
	For each scripting method (client-side and server-side), give an appropriate example and justify your response	2013 A Level Paper 2, Q1(h)
	Explain what software needs to be developed to provide customer facility through web browser	2014 A Level Paper 2, Q1(g)
<b>Data Encoding</b>	Calculate the denary base-10 value of 4D	2023 A Level Paper 1, Q5(c)(i)

Topic	Question	Year, Question Number
	Give the binary representation of 4D	2023 A Level Paper 1, Q5(c)(ii)
	Explain one advantage of using UTF-8 encoding rather than using ASCII	2023 A Level Paper 1, Q5(c)(iii)
<b>DoS Attacks</b>	Explain how a denial of service (DOS) attack can compromise an internet server	2021 A Level Paper 1, Q3(a)
	State two reasons why the monitoring software generates the warning	2021 A Level Paper 1, Q3(b)
<b>Physical &amp; Software Security</b>	Describe two suitable physical security measures that could be adopted	2015 A Level Paper 2, Q1(g)
	Describe two suitable software security measures that could be adopted	2015 A Level Paper 2, Q1(h)
	Explain how the university's investment in the software can be legally protected	2015 A Level Paper 2, Q1(i)
	Describe a strategy that could be used to prevent data loss	2018 A Level Paper 2, Q4(c)
	Describe two issues that might be in the document with regard to customers accessing their data	2014 A Level Paper 2, Q1(h)
	Describe one advantage and one disadvantage for the employee of working from home	2017 A Level Paper 2, Q2(d)

## Topic Summary

The analysis reveals **15 major topics** covering:

- **Security-focused topics:** Digital signatures, firewalls, authentication, physical/software security, DoS attacks
- **Network architecture:** Client-server models, protocols, packet switching, routers/switches
- **Data transmission:** Error detection, encoding, asynchronous transmission
- **Modern technologies:** Cloud computing, intranet, DNS
- **Practical applications:** Network topologies, scripting methods

This categorization provides a comprehensive framework for studying network and security concepts across the A-Level curriculum from 2013-2024.

