

### True statement regarding MAC addresses (in a functional network)

In one local area network (LAN), two cards with the same MAC address can operate.

Every network node must have exactly one MAC address.

Or

In one local area network (LAN), two cards with the same MAC address can operate.

MAC address is assigned dynamically by local network server.

### Untrue statement about IP address assignment

Every end customer in a region gets addresses assigned from the regional registry (RIR).

The computer may select a link-local (link-scope) address itself.

Or

If a network uses private addresses, the computer decides itself, which address to use.

Host IP address (public or private) allocation method is decided by network management.

### Untrue statement regarding layered network architecture

Facilitates writing applications because it is possible for hosts to communicate immediately on the application layer without using lower layers.

Facilitates cooperation of components from various manufacturers.

Or

Facilitates writing applications because it is possible for hosts to communicate immediately on the application layer without using lower layers.

Facilitates replacement of one technology by another.

### True statement regarding nameservers

Secondary server may have different data than primary server for some time.

If a secondary server receives a query, it first checks whether the primary server is not on-line and in this case it responds to the query.

or

The aim of having a secondary server is to backup the function of the primary one, however it responds to client queries independently to the primary server state.

Before sending a response to the client, the caching-only server verifies whether the authoritative server (primary or secondary) does not have more recent data.

or

Caching-only server for specific domain knows from this domain only records acquired by previous queries and only for the term before they expire.

If nameserver handles a recursive query of the client, it gradually asks servers on hierarchical basis until it finds primary server for the target query domain.

If we call the ping program to address 127.0.0.1 what can we gather from the result: 4 packets transmitted, 0 packets received, 100.0% packet loss

IP software on the local computer has been improperly configured.

There has been a problem either with physical layer on the local computer.

What does the VoIP (voice over IP) term denote

No statement is correct.

Another name for SIP protocol used for transmission of voice over computer network.

Or

No statement is correct.

Another name for H.323 protocol used for transmission of voice over computer network.

Or

No statement is correct.

Use of computer network cabling for connection of classic telephone devices and a building switchboard exchange.

Or

A general term describing technologies, mutually incompatible in general, for voice transmission (SIP, H.323, Skype...).

No statement is correct.

What is the primary function of CSMA/CD

Resolves the problems of the stations' concurrent access to the medium.

Defines the scope of a network where collisions may occur.

Or

Defines the algorithm according to which a station is to proceed when transmitting data.

Maps IP addresses to MAC addresses.

Highlight a task that is not subject to the operation of any transport layer protocol

To manage client-server dialogue according to relevant application protocol.

To segment data in a manner convenient for the network layer.

Or

To manage client-server dialogue according to relevant application protocol.

To identify data by affiliation to applications/processes.

Default router for a network has address 172.31.219.65/26. Which of the following settings may be correct computer address in this network?

None of the above settings is correct.

172.31.219.64/26

172.31.219.126/26

Or 172.31.219.64/26

Which statement about network topology is true

Deterministic access is commonly used in ring topology; a station is allowed to transmit only if it holds a permission in given moment.

Star topology means that all nodes in the local network are connected to one central end device.

### Which statement about VLAN is true

Individual VLANs are identified by a 12-bit number.

VLAN is a technology facilitating operation of geographically separate networks connected across public Internet as a single LAN.

Or

For the use of VLAN all intermediary nodes have to be able to handle frames exceeding maximum size, or the maximum frame size (MTU) for a network has to be reduced.

VLAN is a technology facilitating operation of geographically separate networks connected across public Internet as a single LAN.

### Which of the following statements about roles of particular components in electronic mail transmission is true?

Every mail transfer agent (MTA) participating on the transfer usually adds tracing information to the mail header (Received header).

Every router on the path from sender to recipient acts as MTA (Mail Transfer Agent).

Or

Mail exchanger (defined by an MX RR in DNS) is a mail server designated for reception of mail for particular domain.

User program (MUA) has to send messages to the Internet through a host defined in DNS as mail exchanger (MX).

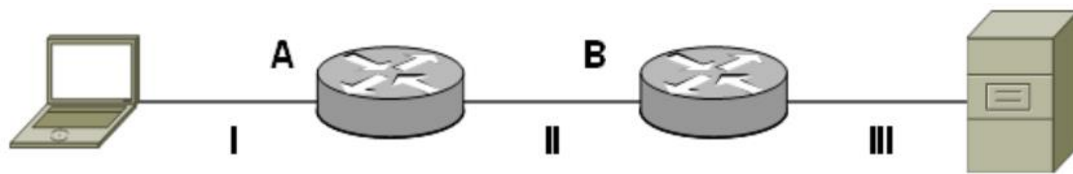
### What steps does the client have to do for correct sending out a packet in case the destination server is not in the same network?

Search the routing table for the most specific entry matching the destination address.

The client host has to find the destination host address either in the ARP table or through the ARP protocol.



How will the source and destination IP and MAC addresses of a response from the server to a request from a notebook look like travelling on subnet marked III? (NAT is not used.)



Source IP and MAC: server, destination MAC: router B, destination IP: notebook.

Source IP: notebook, source MAC: server, destination MAC: router B, dest. IP: server.

or

No statement is correct.

Source IP as well as MAC: server, destination MAC and IP: notebook.

What can we deduce from packet description in tcpdump program?  
19.1.2.3:21 > 10.1.1.1:5391 Flags [SYN, ACK], seq 98765, ack 1234

It is the second packet of a connection (probably) to a FTP server.

Previous packet had flag [SYN] and ACK 12344.

Why do clock in computers in a network synchronize

It facilitates comparing logs from different machines when detecting problems.

Time synchronization is necessary for correct resolution of collisions in Ethernet network.

How does DHCP protocol work

The address lease time is limited. During this period the client has to ask for assignment confirmation. If he fails to get it he has to release the address when the lease expires.

When the client needs to establish a new connection, he sends request to DHCP server for dynamic address assignment which address holds valid for the time of this connection.

or

Client sends a DHCP request to find out the parameters of his connection to IP network. To do so he uses a broadcast address, so the request is delivered to all hosts.

Client has to have DHCP server address stored in his configuration. He sends request to this server to find out the parameters of his connection to IP network.

Which of the following protocols is used in TCP/IP on the application layer?

NFS

TLS

What does the acronym HTML signify

A language that allows writing text together with non-text elements, formatting and other metainformation.

No statement is correct.

or

No statement is correct.

An obsolete language for writing web pages; replaced by the XML language nowadays.

Which statement about security aspects of email protocol is correct

In IMAP protocol, encryption may be achieved either by establishing connection to another port (993 instead of 143) or within the protocol by STARTTLS command.

The digital signature of the mail guarantees the author, content integrity must be secured by encryption of the text.

Or

A user has to authenticate on the server for approaching mails via POP and IMAP protocol.

The digital signature of the mail guarantees the author, content integrity must be secured by encryption of the text.

Or

The digital signature of the mail guarantees both the content integrity and mail author (i.e. the fact that the sender had access to the private key, which had been used).

Before sending a mail in SMTP protocol, the client has to authenticate on the server.

Which of the TCP descriptions is not correct

TCP allows multiplexing - running an application using various network layer protocols.

TCP provides reliability of packet delivery for applications.

or

When the TCP is used, the IP layer delivers packets reliably.

TCP segments application data, if needed so.

Which of the following terms does not belong among transmission quantities (measurable parameters) of a computer network?

best effort

bandwidth

Or

encapsulation

jitter

Or

request for comments

bandwidth

What does CRC stand for

CRC is a hash function used e.g. in FCS (Frame Check Sequence) in Ethernet frames.

Cyclic Redundancy Check (cyclic checksum) is a function gradually adding the byte values, which serves for detection of transmission errors.

What's a proper description of repeater, hub, bridge, and switch?

No statement is correct.

Source IP as well as MAC: server, destination MAC and IP: notebook.

Which of the following statements about use of mail transfer protocols is correct?

An application for mail handling (MUA) can be also run directly on an email server (MTA); in this case it might be possible to connect to the server through SSH or HTTP protocol.

IMAP is a modern replacement of POP; it allows inter alia even to send mails.

Or

For receiving messages from remote server (MTA), an email client (MUA) may use either of the POP or IMAP protocols.

IMAP is a modern replacement of POP; it allows inter alia even to send mails.

What will happen if UDP packets arrive out of order

Application will rearrange the packets if necessary.

No statement is correct.

Mark true statement regarding P2P and/or the client server application models.

Application in both models can communicate with multiple hosts in parallel.

Peer-to-peer is a term dedicated for applications sharing illegal data.

or

A program in the client-server model can have several connections opened as a client and several as a server at the same time.

In the client-server connection data flows only from the server while in the P2P in both directions.

Choose correct statement about the purpose or usage of IP header field TTL.

The TTL field is also used by the `traceroute` program when diagnosing routing problems.

The TTL field in the IP header prevents from creating routing loops in router configuration.

Mark untrue alternative, how a host can learn the IP address it is allowed to use?

It can read the IP address assigned by the manufacturer from network interface card.

It sends a query in DHCP and chooses an address from server offers.

Choose correct statement about router functions.

Router on the border of local network may be configured so that certain type of traffic is denied to deliver and it drops such packets.

Router reads sender's IP address and using it chooses the path to destination network.

Or



For proper function, a router in an Ethernet network usually has to refresh MAC addresses of next-hop routers over a period of time by means of ARP protocol.

Router reads destination IP address from the packet and it determines (using some routing protocol) where to send the packet next.

What does belong among the tasks performed by the application layer in TCP/IP model

To define message format independent on hardware used on the client and server.

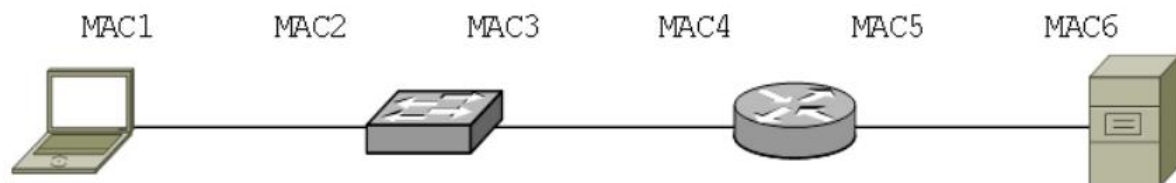
All the tasks listed above belong to the application layer.

Or

To provide a communication channel for the client and server part of application.

All the tasks listed above belong to the application layer.

The notebook sent out a HTTP request, which just reached the server. Which statement about ARP cache contents on a notebook, switch, router, and server is apparently true



The notebook cache contains address MAC4, the router one contains MAC1 and MAC6.

The server ARP cache contains address MAC1, the router one contains MAC1 and MAC6.

Or

The server ARP cache contains address MAC5, the router one contains MAC1 and MAC6.

The notebook ARP cache contains address MAC2, the server one contains MAC5.

Which statement describes the Diffie-Hellman algorithm

No statement is correct.

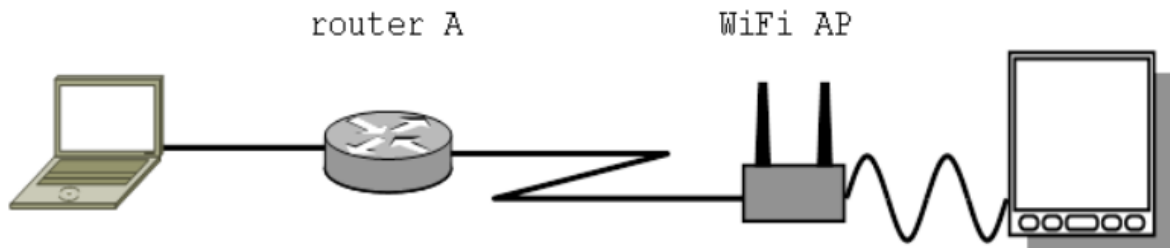
It ranks among the fastest encryption algorithms.

Which statement about routing table management is true

Dynamic management of routing table results in higher router CPU load.

Static management of routing table is no more used today due to its rigidity.

How many times in total) does a CRC calculation (for computing the Frame Check Sequence) run during the transmission of one packet between the end devices in the figure?



No statement is correct.

4x

Or

No statement is correct.

2x

Which statement about the nature of the FTP protocol is correct

The server FTP response begins with a number determining the response type; values 2xx mean a good result and 5xx a bad one.

In case of passive data transfer, an FTP client establishes connection to a server and over this connection it sends control commands and then data.

What information can we find in both TCP and UDP header

none of the above

sequence number (SEQ number)

Or

source port

application protocol number

Or

none of the above

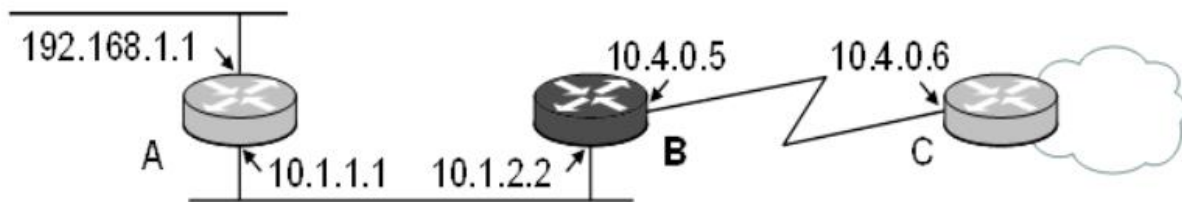
window size

Which statement about IP address types is true

A loopback address may be used even on a computer with no network interface card.

An anycast address is an address of arbitrary network interface of a particular computer.

Which entry might be a valid row in the routing table of router B in the following picture.



destination 192.168.1.0/24 gateway 10.1.1.1

destination 10.4.0.0/30 gateway 10.4.0.5

Which of the following statements about RFC is true

RFCs are used for publishing of standards, but many applications do not respect them.

No statement is correct.

or

When an RFC is updated, it gets a new number.

The RFC index file serves to find out the current status.

No statement is correct.

Or

RFC are freely available on the internet.

Request For Comments is name of a web service for evaluating web pages.

What does the SIP (Session Initiation Protocol) term denote?

One of the VoIP (internet telephony) protocols; a text protocol that replaces some older binary protocols from the H.323 set.

A part of TCP protocol, by means of which session is established.

Or

A protocol that builds base for arrangement between communicating parties about parameters of data channels for multimedia transmission.

A part of TCP protocol, by means of which session is established.

What way is clock synchronization of computers in a network performed?

Using NTP protocol. NTP server may have its own reference time source (an atomic clock, a GPS clock and the like) or it gets time itself by NTP from other servers.

The client sends request to NTP server and receives response containing the exact time he than sets on his machine.

or

NTP client commonly polls multiple servers and to determine the time he uses Marzullo's algorithm.

The client sends request to NTP server and receives response containing the exact time he than sets on his machine.

Which of the following statements about the nature of DNS protocol is correct.

DNS is a binary protocol, information unit is called resource record (RR).

Client requests are usually using a connection-oriented model - client establishes a connection, sends a number of queries and waits for responses.

Or

For better security, an extension to the DNS protocol called DNSSEC was developed.

The DNS cache poisoning attack consists in the server sending the client another, false information instead of response to his query.

Or

DNS client may use TCP or UDP transport protocol.

In response to a request regarding a name in a domain, the authoritative server sends the client the contents of the zone database so the client could search the required data.



## What statement about security of SSH access is correct

If we want to allow remote access without a password, we generate a pair of keys, placing the secret one on the client and the public one on the server.

Allowing access without a password from host A to host B brings a security risk, because it allows the attacker from host B to automatically pass over to host A without a password.

or

Upon user authentication with a key, no password is sent over the network; however it is recommended to protect the private key on the client machine with a password.

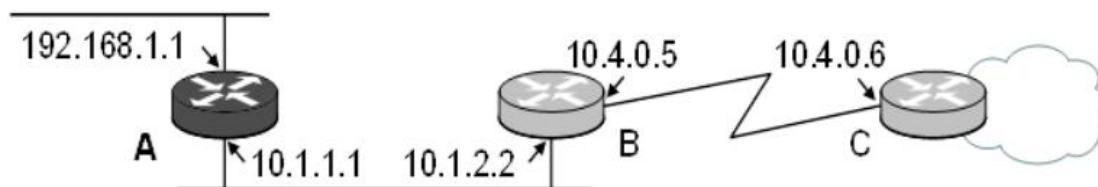
If we want to allow remote access without a password, it suffices to store a certificate on the client.

## What is the primary use of the trailer in a data link frame?

Enables partial detection of errors.

Provides delivery of the packets in sequence.

## Which entry might be a valid row in the routing table of router A from the following figure



destination 10.4.0.4/30 gateway 10.1.2.2

destination 10.1.0.0/16 gateway 10.1.2.2

Or

default gateway 10.1.2.2

destination 10.4.0.0/30 gateway 10.4.0.5

## What statement about deterministic and non-deterministic access to a medium is true

In non-deterministic access the situation may occur when two stations are transmitting at the same time, this situation needs to be resolved somehow.

Deterministic access means that there has to exist one control node in the network, which decides who can transmit.

or

In non-deterministic access, nobody controls which network node may transmit.

Deterministic access is used e.g. by CSMA/CA to avoid collisions.

What is the purpose of the default gateway

It provides the address of implicit router for communication from own IP network.

It identifies the switch through which a network is connected to other networks.

Which of the IP filtering characteristics is correct

IP filtering serves to protect a local network; it works well for single-channel protocols (HTTP), using it for multiple-channel protocols (FTP, SIP) is more complicated.

Strict IP filtering mode means that packets of chosen application protocols may exit from the internal network to the Internet, but no packets are allowed to come in.

Or

A router with IP filtering serves to separate traffic between networks with different security requirements (e.g. intranet, DMZ, internet).

IP filtering is filtering on the IP layer; it serves for blocking unwanted application protocols traffic.

Mark correct statement about procedures in ensuring the reliability of TCP

The recipient may choose whether he sends the confirmation as a separate packet with no data or by adding the ACK flag to next data packet.

The station may send the next segment after receiving confirmation of delivery of the previous segment.

Which command is not an SMTP protocol command according to RFC 821

GET

All commands do exist in RFC 821.

Or

GET

RCPT

If an FTP client sends a request to an FTP server on standard port, which of the following ports may the response contain as source port?

none of the above

1023

Or

none of the above

65536

What can we deduce from packet description in tcpdump program?

10.4.5.6:21 > 10.1.1.1:5391 Flags [PSH, ACK], seq 200, length 100

It is a packet carrying the last part of the response (probably) from FTP server.

It is a packet carrying data of a file transferred from FTP server.

What type of addresses is used on data link layer

physical

logical

Or

MAC

internet addresses

Which of the following does not work with IP addresses

TCP

ICMP

What information is usually dynamically chosen by a client connecting to a server

source port

source network address

Or

none of the above

DHCP

Or

TCP SEQ number

DHCP

Which of the following statements about FTP security issues is correct

For correct function of active FTP transfer mode in a network with address translation, it is necessary that the router can perform application protocol inspection.

Unencrypted password transmission in FTP may be prevented by using the passive transfer mode.

Or

The FTP protocol transfers all data unencrypted and thus allows password eavesdropping

The FTP protocol cannot be used in network with NAT because the server has to be able to establish data connection to the client's address, which is not possible for private ones.

How can spanning tree protocol or spanning tree algorithm be described

STP can protect the network from loops, but it means slower startup time of the lines.

Switches use STP, hubs STA.

Which protocol provides unreliable data transfer service on the network layer

None of the above.

UDP

Or

IPv6

ARP



Which step follows after the web client finds out the destination server address and prepares the packet in IP protocol to be sent?

Client's host finds out from the routing table the first successive destination node and places its physical address to the data link header.

Client's host transfers data into bit stream for transmission over the network.

Which statement about the media used in computer networking is correct

Transmission over metallic cable may be protected against interference by means of shielding (use of STP instead of UTP).

During digital transmission, changes in signal are not smooth, but they are abrupt (the signal waveform has sharp "edges").

Which statement regarding cookies is correct

Cookies compensate for the missing session state information within stateless HTTP.

Using cookies, a server can learn sensitive information about the client computer and the user without the browser's knowledge.

Which field in the IP header does the router change under normal circumstances

header checksum

destination IP address

Which of the following actions is part of the three way handshake

The server confirms the client readiness to establish a TCP connection.

Both sides of an application acknowledge transferred data.

Or

Both parties of the TCP connection initialize SEQ numbers.

One side of the application acknowledges the volume of data received from the other.

What happens if network containing destination is not found in the routing table

If a default gateway exists, this path is used.

The computer starts communication in routing protocol to determine the path.

Or

If no default gateway exists, the packet is discarded.

The computer uses ARP table to determine the path.

Which IPv4 address has all ones in the host part

No answer is correct.

loopback address

Or

No answer is correct.

unicast address

Which application is used for file system sharing

NFS

Telnet

Which statement correctly describes common implementation of operation system service "find out the IP address for a given domain name"?

The information is learned by a DNS client using recursive query sent to one of nameservers specified in its configuration by their IP addresses.

DNS client on local host sends a recursive query to the server, the domain name of which it has set in the client configuration, the server solves the query and sends response.

Or

The information is learned by a DNS client using recursive query sent to one of nameservers specified in its configuration by their IP addresses.

Particular operating system function gradually sends queries to authoritative servers in the hierarchy from root servers to searched name domain's servers.

Which of the following represents correct computer address

172.16.4.190/26

172.16.4.192/26

Or

172.16.4.193/26

172.16.4.191/26

What TLD (TOP Level Domain) can we find in the following URI

`ftp://sunsite.mff.cuni.cz/Network/RFCs/rfc-index.txt`

`CZ`

None of the options is right.

What can we deduce from a (a complete) output of the netstat -an program run.

Proto	Local Address	Foreign Address	(state)
tcp	195.113.19.70:55745	84.242.65.54:80	ESTABLISHED
tcp	195.113.19.70:61111	195.113.19.71:80	ESTABLISHED
tcp	195.113.19.70:21	*:*	LISTEN
udp	10.1.19.70:53	*:*	

Remote login to the computer is not possible, neither using SSH nor telnet.

There are multiple web browsers running on the computer.

Or

There is probably a nameserver running on the computer, which is not accessible from the internet.

An FTP server is running on the computer but it is not clear whether it is now attending to a client as we maybe caught the status in between individual commands.

Mark the term which is not a network layer function

modulation

forwarding

Or

switching

routing

On what principle does electronic mail encryption work

No statement is correct.

First, the hash is created from the text and then it is used as an encryption key for asymmetric encryption for each recipient individually.

Which of the network address translation (NAT) is not correct

In terms of security, NAT brings the problem that without additional information from router it is impossible to determine the unique client when having the connection source IP address.

NAT enables servers in the internet to respond to local network client packets even although they arrive with private source address.

Which statement regarding URI is correct

Destination port for communication to server may be derived from URI.

If a URI does not contain a scheme, it is always the HTTP protocol.

Or

Query parameters may be part of a URI for some schemas.

The first URI item (before the colon) contains protocol name (e.g. http, smtp).

Mark true statement about distance-vector routing protocols

A calculation error in one router may cause error in all other routers.

These protocols have been enhanced by adding of features for elimination of drawbacks, e.g. slow convergence may be suppressed by limiting the network diameter to 16 "hops".

What do we call protocol used to transmit web pages

None of these acronyms provides a correct answer.

HTML

Which statement about ARP is true

ARP table (cache) stores also data about the nodes that have sent us their ARP requests.

The ARP is used to convert solely IP and ethernet addresses, other specific protocols have to be used for other network and physical address types.



Or

The ARP is used for conversion between network and physical addresses (not necessarily only IP and Ethernet).

Address Resolution Protocol is used to translate host names to IP addresses.

Which statement about WiFi is correct

WiFi protocols use CSMA/CA method with frame delivery confirmation.

SSID identifies WiFi network and guarantees protection from unauthorized access to it.

What is the difference between single-mode (SM) and multi-mode(MM) optical fibre?

Single-mode cable enables, thanks to the technology used for light signal emitting, larger range (distance) and higher bandwidth.

SM cable can be used only for half duplex, for full duplex mode we need MM cable.

In what manner is text line representation handled in TCP/IP application protocols

No statement is correct.

Application layer does not handle this, agreement is provided by TCP/IP presentation layer.

By means of which command can we list the contents of a routing table

```
netstat
```

```
ifconfig
```

Mark true statement about link state routing protocols

Calculation of network topology from information acquired by these protocols is sophisticated, therefore it is possible to divide the network into smaller segments.

Unlike distance-vector protocols they do not evaluate paths using a metrics.

Or

Every node (router) itself calculates the entire network map so it can react to topology changes more promptly.

Unlike distance-vector protocols they do not evaluate paths using a metrics.

Which of the following is not a protocol of the TCP/IP application layer

TLS

SIP

Which of the following about the authenticity of the message origin is correct

The sender authenticity cannot be guaranteed by means of SMTP protocol.

Upon receipt of a message, MTA may contact the sending client over independent connection to verify that the mail is being really sent by the declared sender.

Which of the proxy server characteristics is correct

Non-transparent proxy server may only be used for protocols that have support for this, because the information about the real target has to be carried within the protocol.

Proxy server is an application, which has to work on the boundary router of a local network and which enables communication from private network to the Internet.

Or

Local network clients can be forced to use proxy server without changing their configuration.

The difference between non-transparent and transparent proxy server is that the latter establishes a connection to the target server using the real client's source IP address.

What principle is used for electronic signing of a document

No statement is correct.

Hash is calculated from the text, it is symmetrically encrypted, used encryption key is asymmetrically encrypted by recipient's public key and sent together with the document.

Which of the following statements correctly describes the function of particular application protocol

SIP mediates dialog creation in VoIP (de facto the function of the OSI session layer).

SMTP extends the possibilities of IMAP by secured form of transmission.

Which of these functions can be provided by ICMP(Internet Control Message Protocol)

By means of ICMP destination availability may be detected by ping program.

ICMP is one of the dynamic routing protocols.

Which protocol provides reliable data transfer service on the network layer

None of the above.

IPv4

Or

None of the above.

TCP

Which of the following methods("commands") exists in the HTTP protocol

POST - sending data to a server

USER - entering a username (and password) for further access to a server

Or

CONNECT - a tunnel establishment request

POST - sending a mail message from a web mailbox

Which statement about interconnection of two nodes of Ethernet network by cables is true

If we use cards without MDI/MDIX autodetection, we use a crossover cable to connect a computer to a router.

For the switch-to-switch connection we have to use an STP cable.

Which of the following statements regarding WAN is true

The main purpose of WAN is communication and remote access.

For its functions WAN requires much higher transmission rates than LAN.

What statement about the security aspects of the DNS protocol is correct

If an attacker can read a query, he can send arbitrarily faked answer; the only prevention consists in the fact that it is hard to guess the exact content of a query.

If the answer is tagged by AUTHORITATIVE flag, we are sure, that all information provided by the server is authoritative (i.e. the server was authorized to provide it).

Which of the following is the correct sequence in OSI model from top to bottom

None of the above sequences is correct.

application, transport, network, presentation, session, data link, physical

With what OSI layer the term Ethernet is related

physical and data link

network

Which doesn't belong among the tasks performed by the network layer

To provide local switches with information on local destination network addresses.

To hand data to lower layers together with information about the target host or router.

Which data transfer parameter determines what data range a station may send without waiting for confirmation of the counterparty?

window size

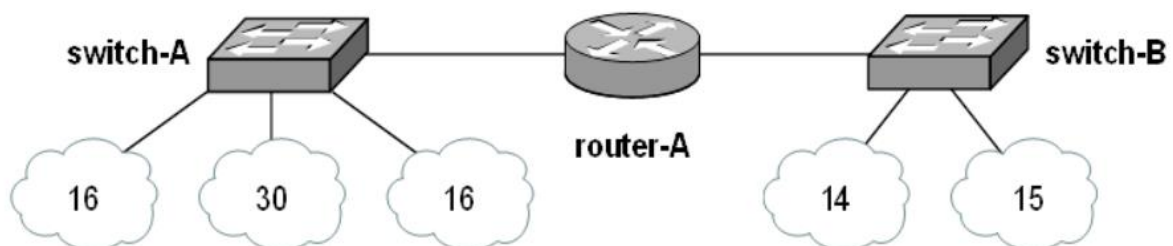
none of the above

How many bits are there in IPv6

128

256

How many and how large IP subnets are required to cover a network with the following needs for number of connected hosts when using VLSM (Variable Length Subnet Mask)?



Two subnets with 25 and 27 bits masks.

Five subnets with 27 bits masks.



What does the acronym STP stand for

Shielded Twisted Pair - a more reliable alternative option of UTP cable.

Simple Transfer Protocol - an application protocol enabling simplified transfer of files without the need for authentication.

What information from the packet does every router use to determine the path

None of the above responses is correct.

destination address and port

Nodes A, B, C and D are connected to a hub. Node A is transmitting a frame to node D, when node B needs to transmit data to node C. What does node B need to do?

Wait till node A ends the transmission and the carrier is free.

Nothing, it is connected over an independent cable and may transmit immediately.

With what TCP/IP layer the term port is related

none of the above

session

Which statement correctly describes the issues of remote login by means of telnet and SSH protocols?

If a SSH server sends a new unknown key to the client, the program asks the user whether to accept it. The user should not answer without verifying the key.

The telnet protocol transfers passwords unencrypted, it can be used as secure solely within the framework of local area network segmented by switches.