

# It infrastructure answers essay sample

[Technology](#), [Internet](#)



Convergence - In the telecommunications industry, convergence refers to the integration of voice, internet, broadcasting, and other telephony servers into one mega-industry from their traditionally separate industries.

Companies such as Telstra are an excellent example of this, as Telstra now offers an abundance of products such as, Fixed Phone, Mobile Phone, Dialup Internet, Broadband Internet, Wireless Internet, TV, Music, Tickets, and more.

Incentives are given to "bundle" services with the one particular provider, which can have advantages and disadvantages. Unified Communications -

This term refers to the integration of video, voice, data and messaging into a software suite. A particular advantage of these suits is that they bring online (email, IM) and offline (PSTN voice, SMS) together into one place. Each of the communication methods are separated into different products, however they all operate in conjunction to bring an efficient communications solution to the end user. 2. 3

A company's telephone exchange digitizes telephone channels at 8000 smp/s, using 8 bits for quantization. This telephone exchange must transmit simultaneously 24 of these telephone channels over a communications link.

a. What's the required data rate?

$8\text{b/smp} * 8,000\text{smp/s} = 64,000 \text{ bits per second (textbook p. 34)}$

$64,000 * 24 = 1,536,000 \text{ bits per second OR } 1.46484375 \text{ Mbits per second}$

\* =

b. In order to provide answering-machine service, the telephone exchange can store 3-minute audio messages of the same quality as that of the telephone channels. How many megabytes of data storage space are needed

to store each of these audio messages?  $1.46484375 \text{ Mbit} / 24 = 0.$

$06103515625 \text{ Mbit}$

$/ =$

$0.06103515625 \text{ Mbit} / 8 = 0.00762939453125 \text{ megabytes}$

$/ 8 =$

$3 \text{ minutes} = 180 \text{ seconds}$

$0.00762939453125 * 180 = 1.373291015625 \text{ Megabytes per 3-minute audio message} * =$

2. 12

When examining X-rays, radiologist often deal with four to six images at a time. For a faithful digital representation of an X-ray photography, a pixel array of 2048 by 2048 is typically used with a greyscale of intensity for each pixel of 12 bits. As you would hope, radiologist do not look kindly on compression that degrades quality. a. How many levels of grayscale are represent by 12 bits?  $2^{12} = 4096$  levels of grayscale

b. How many bits does it take to represent an X-ray based on these parameters?  $2048 * 2048 * 12 = 50,331,648$  bits

$** =$

c. Suppose five X-rays have to be sent to another site over a T-1 line (1.544 mbps). How long would it take, at best - ignoring overhead?  $50,331,648 / 1,048,576 = 48 \text{ Mbit}$

$/ =$

$48 / 1.544 = 31.0880829015544 \text{ seconds}$

$/ =$

31.  $0.880829015544 \times 5 = 155.440414507772$  seconds

\* =

d. Suppose now that we wish to build a communications system that will provide the five X-rays of part (c) upon demand; that is, that from the time the X-rays are requested we want them available within 2 s. What is a lowest channel rate that can support this demand?  $48 \text{ Mbit} \times 5 = 240 \text{ Mbit}$

\* =

$240 \text{ Mbit} / 2 = 120 \text{ Mbits per second}$

/ =

e. The next generation of displays for X-rays is planned for 4096 by 4096 pixels with a 12-bit grayscale. What does the answer to part d become when using this resolution?  $4096 \times 4096 \times 12 = 201,326,592$  bits

\*\* =

$201,326,592 / 1,048,576 = 192 \text{ Mbit}$

/ =

$192 \times 5 = 960 \text{ Mbit}$

\* =

$960 / 2 = 480 \text{ Mbits per second}$

/ =

3.7

Off the shelf software is a pre-customised software solution which users buy, install and can use immediately. One of the most well known off the shelf software solutions would be the Microsoft Office suite, which after installation, can be used immediately without any tailoring. Off the shelf

software is often found to have many “useless” features and generally feel bloated, which is one of the downsides to non-customised software.

However, it is much easier to provide support for, as support staff will be able to replicate most problems for troubleshooting. End user programming is a software solution which is gaining some momentum in areas of the market where customisation is paramount to business success.

End user programming allows you to take prewritten modules and assemble them into a solution which fits a particular use well, without having to learn advanced programming techniques. Increasingly, large organisations are customising their internal communications software to suit the organisation’s needs. This is often end-user programming, however is occasionally outsourced to technical support companies. Gaining technical support for this particular solution can be troublesome and expensive, as the support officers must become completely familiar with the software before they can supply advice. 4. 1

Both circuit-switching and packet-switching are methods of data communication between two parties. In circuit switching, both parties agree on a specific path which the data will travel along while the connection is open using a resource optimization algorithm before the transmission begins. The route is used exclusively for the entire session and only released when the session is terminated. In packet-switching, the path which the data takes is not predetermined but rather decided upon by the packets during transit. It does this using the packet header which contains all the

information it needs to get to its destination. At each hop, the packet will re-evaluate the shortest path to get to the destination.

Packet switching is the more appropriate technology to be used for the internet because of the dynamics of the internet itself. Computers connected to the internet are being constantly added and removed from the network (turned on/turned off), and this dynamic nature means that to choose a static route (circuit switching) for data to travel along will never be the most efficient way. Not to mention, if one of the hops you were using disappears, the circuit is broken and communication is ceased. Circuit switching's main use in today's environment is limited generally to proprietary systems and also the PSTN phone system. 5. 12

Both the TCP and IP layers work well to check that lost, corrupted, or delayed packets can be recovered, to ensure the integrity of the data being transferred is kept. Each packet contains headers which consist of multiple layers. These headers will depend on the protocol being used. The IP Header contains fields such as Source Address, Destination Address, Protocol, Total Length, etc, which all help to ensure the packet is delivered to the correct recipient. The TCP layer works to not only encapsulate the data being transferred, but also to deliver integrity checks. A TCP Header consists of fields such as Sequence Number, Acknowledgment Number and Header Length to ensure that all packets are received and placed into the correct order.

Should the sending computer not receive an acknowledgment for a particular packet (i. e. a “lost packet”) back from the recipient computer, it will

continue to send that packet until one is received. Should the recipient computer not receive a packet as part of a sequence (i. e. a delayed packet), it can request the packet to be resent. Both headers contain checksums, which are verified on the recipient computer to ensure a packet is not corrupt. If a packet is found to be corrupt (i. e. a “wasted packet”) it will be ignored and a resend request will be made. These mechanisms ensure that all data transferred is complete and correct, and is very useful over less reliable connections (such as wireless connections, or long-distance wired connections on noisy lines). 6. 7

Thick client strategy

Advantages| Disadvantages|

\* Client-side processing means that server stress is minimized. \* Less network traffic resulting in faster response times. \* Servers have a longer life-span as they are not outdated as quickly. \* Clients are much more customizable. | \* Maintenance can be troublesome as technical support must manually make changes to clients. \* Generally uses more IT resources as a non-standard environment means more spare parts and solutions must be kept onsite. \* A larger security risk than thin clients. |

Thick server strategy

Advantages| Disadvantages|

\* Stateless environments are much more secure from viruses and malware. \* Clients do not require updating as often. \* Programs and updates only need to be installed once for all clients to be able to access them. \* More efficient use of resources. | \* Servers must handle the bulk of the processing and

hence are usually very expensive, cutting-edge machines. \* Clients are unable to run some multimedia-rich applications. \* High-latency networks can cause slower user response times.]