Designing an IP Addressing Scheme

CI5220 Networking and Operating Systems

Aim of the Coursework

This IP addressing design coursework is intended to develop your understanding of the structure of IP addresses, the role of subnet and supernet masks, how a suitable public IP addressing scheme might be designed for an enterprise, and how this is subsequently used to assign IP addresses to subnets as well as hosts.

Requirement

An enterprise wishes to develop a public IP addressing scheme to allow it to connect to the Internet. Using the company specification and the physical network design given below, develop a suitable *fixed-length subnet mask* IP addressing scheme and assign addresses to all your subnets and router connections i.e. the routers' *points of attachment*.

Your answer should contain (i) a clear description of the methodology you have followed (ii) the subnet and supernet masks that arise from your design (and expressed in the appropriate notation), and (iii) a list of the subnet and router IP addresses you have created in dot notation. (Make sure you clearly identify to which subnets and router *points of attachment* these addresses are assigned.)

The network address assigned to your company 80.169.96.0.

Additional Points

- You should follow the *fixed-length subnet masking* methodology outlined in the L3b *Designing an IP Addressing Scheme* lecture notes.
- Although this coursework requires a *fixed-length subnet mask* addressing scheme, you may wish to submit an additional *variable-length subnet mask* (VLSM) addressing scheme. Additional marks can be gained in this way - see the marking criteria. Note however that a fixed length subnet marking scheme must be submitted.
- Note that there is not necessarily a single correct answer.
- If you feel any of the specification below is ambiguous or unclear, feel free to make any sensible assumptions though remember to write down these assumptions in your report.
- There are no specific length or word count requirements. However please note the marking criteria listed overleaf.
- You are strongly advised to complete the workshop exercises before starting the coursework.
- You are strongly advised to show all steps in your working.
- You are strongly advised to interpret the requirement "Your answer should contain (i) a clear description of the methodology you have followed" as the need to generate a professional report. Please pay attention to the relevant assessment criterion.

Deadline: Thursday January 10th 2019

Specification

Specification

We've Got Worms is a company based in Rhode Island, USA, founded by Lloyd Christmas and Harry Dunne and specialising in the supply of fishing bait. The company has three sites at Providence, Pawtucket and Johnston.

The head office is located in Providence while the main production and packaging operation is in Pawtucket. From the Johnston sales office company reps place bulk orders with fishing resorts across the Eastern Seaboard. The Johnston and Pawtucket sites have been connected to the Providence site by leased lines. All sales and inventory databases and web and e-mail applications are run from a central server located in Providence.

The Providence building has three floors housing the Human Resources (HR), Marketing and Accounts teams respectively. The HR team (on the top floor) are distributed across a dozen offices, each with a single PC. Marketing have forty five staff while the large Accounts team has one hundred and fifteen members. Each of these employees has a PC. All workgroups use 100baseT switched-Ethernet linked to a legacy ATM backbone.

The Pawtucket site is a modern production and packaging operation comprising forty automatic worm-harvesters (each an IP host). Twenty employees are spread between the similarly-sized Maintenance and Support teams, each of whom has a PC.

The small Johnstown office is located on a single floor of a converted warehouse building. It employs twenty people, each with their own PC. (Figure Q1 shows the physical architecture.)

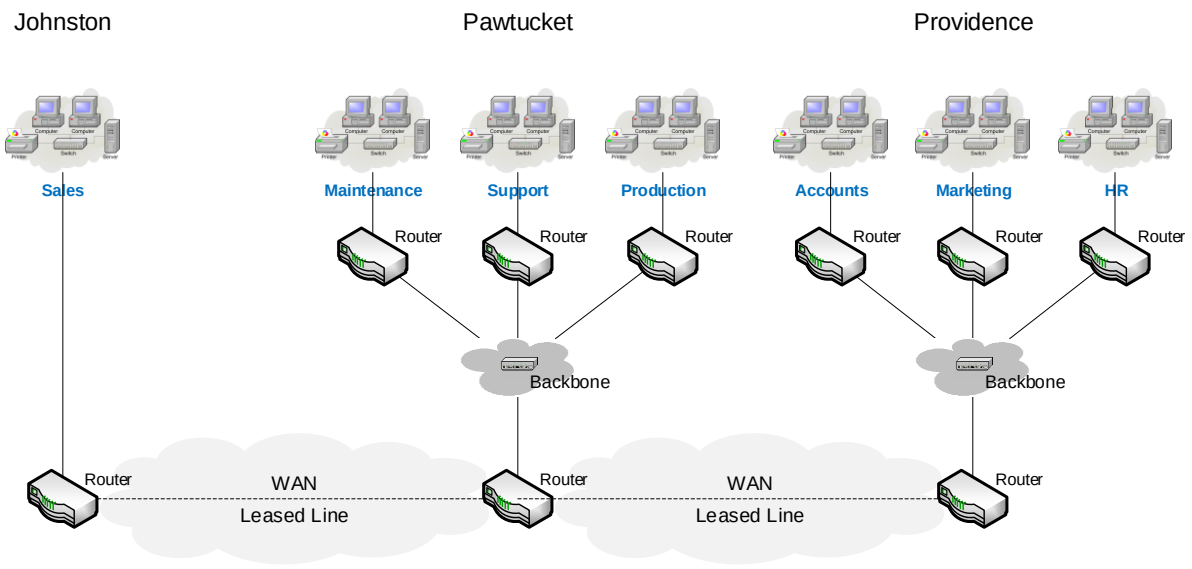

Figure Q1 Physical Design

Submission Requirements

Upload your document to the submission box within the Assignments page of the Canvas module by midnight of the day of the deadline.

Deadline: Thursday January 10th 2019

If you are ill or have problems which prevent you from meeting the deadline you may be able to negotiate an extension in advance. The University Mitigating Circumstances policy may apply. You will need to use the online Extensions and Mitigation Circumstances system. Remember if you submit a piece of work or attend an examination, you have judged yourself fit to undertake the assessment and cannot claim mitigating circumstances retrospectively.

Marking

The marking scheme will be based on the following assessment criteria:

IP Addressing Scheme

- 40% Calculation of the supernet and subnet masks

Assignment of IP Addresses

- 15% Subnet addresses
- 15% Router addresses

Presentation

- 30% Description of the methodology employed to develop the addressing scheme (using text, diagrams and tables where appropriate).

Marking Criteria

The table on the next page outlines what is required to achieve specific grades in each of the above criteria.

Grade		Outstanding	Exceeded Expectations	Met Expectations	Below Expectations	Fail
		> 80%	**80-65%**	**65-50%**	**50-40%**	**> 40%**
IP Addressing Scheme Use of the information within the specification and physical design to develop an appropriate efficient addressing scheme, and to capture this scheme by calculating the Supernet and Subnet Masks.	40%	For example, correctly used variable length subnet masking to generate a more efficient addressing scheme	Correctly motivated a reasonably efficient addressing scheme and calculated the supernet and subnet masks from information provided in the specification	Minor errors in interpreting the specification, identifying an efficient scheme, or deriving the masks from the specification	Significant errors in interpreting the specification, identifying an efficient scheme, or deriving the masks from the specification	Failure to understand key concepts of the design process such as the role of the specification
IP Address Assignment Use of the addressing scheme capture by the subnet and supernet masks to assign appropriate IP addresses from the given network address to all routers and subnets within the physical network. (15% will be assigned to the router addresses and 15% to the subnet addresses.)	30%	For example, correct allocation of IP addresses using a more complex VLSM scheme.	All router and subnet addresses calculated correctly and consistent with the devised addressing scheme	Minor errors in constructing IP addresses using addressing scheme	Significant errors in constructing IP addresses using addressing scheme	Failure to understand how address constructed or the hierarchical nature of IP addressing
Presentation Clear and professional presentation of the methodology you used and the results you obtained (using an appropriate mixture of text, tables and diagrams).	30%	Main narrative articulates all assumptions and interpretations, justifies all decisions, explains the methodology accurately, and describes the design. Diagrams or tables have descriptive captions and are referenced clearly and appropriately within the main narrative.	Clear articulation of the methodology for computing supernet and subnet masks, as well as process of constructing and allocating IP addresses. Table and/or diagrams appropriate, clear and anchored in textual narrative.	Minor issues in the clarity of the description, failure to articulate some key step in the methodology, or perhaps the use of non-professional English. Minor problems with the diagrams or captions such as legibility, captioning and relationship to text	Significant problems with the clarity of the description or failure to articulate the methodology for computing masks or assigning IP addresses. Significant presentational issues with table or figures.	Failed to provide any meaningful description of the IP design methodology and the process for allocating IP addresses.

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