2620 Digital Communications, Networks and Technology

Introduction

2620 DIGITAL COMMUNICATIONS, NETWORKS AND TECHNOLOGY provides an overview of the process of adapting the corporate network infrastructure to the rapidly changing business environment. Students explore the architecture of digital systems, with emphasis on structural principles common to a wide range of technologies. The focus is on the practical application of new network and data communication technologies and the implications that these technologies have for the organisation's information processing capabilities and information security management.

Case studies
Real-life case studies are incorporated into the subject to provide opportunities for students to apply theory into practice in an authentic context. Examples of cases include

Stallings, W.
Levi Strauss Co.
Business Data Communications, 5th ed.
New Jersey: Pearson Prentice Hall
2005

Stallings, W.
Wisconsin Department of National Resources
Business Data Communications, 5th ed.
New Jersey: Pearson Prentice Hall
2005

Assessment	
Case analyses (team and individual)	45%
Discussion board activities	30%
Final examination	25%

Who should attend

- Managers seeking to understand computer network management and security
- Administrators who need to evaluate and plan an organisation's network infrastructure
- Information technology practitioners wishing to enhance their operational knowledge about new digital systems and technologies

Learning objectives

Upon completion of the subject, students should be able to

- describe and apply the fundamentals of data communications, computer networks, network management and network security
- evaluate the suitability of an organisation's network infrastructure for its business applications
- develop a cost-effective network infrastructure for organisations
- create a baseline security architecture for an organisation's networks
- assess and mitigate the risks of an organisation's network infrastructure

Delivery method

The subject is delivered online over a 12-week period, with an assigned Professor acting as mentor. The class will comprise students from different countries and industry backgrounds. Practical case studies and discussions help to stimulate learning and knowledge exchange, while an examination at the end of the subject will help students review and apply the knowledge and skills learnt.

Prerequisites

None

Syllabus

Segment 1: Introduction

Students are introduced to the syllabus, the resources and communication tools available within the course.

Segment 2: Digital Communication Technology

The segment looks at the principles of basic data communication between two points. Students explore the various transmission media (digital versus analogue), their limitations and how to make effective use of the bandwidth provided. To manage the flow of data, the use of protocols on a digital data link can help control the flow of data and cope with any errors in the transmission. Students learn how to improve the efficiency of data transmission using frequency division multiplexing or time division multiplexing.

Segment 3: Networking Fundamentals

A comparison of Local Area Network (LAN) and Wide Area Network (WAN) technologies helps students analyse how the Media Access Control (MAC) protocol influences the performance of the network. Students learn about the characteristics of a hub-based network versus a switched-based hub, as well as the differences between circuit switching and packet switching. A discussion of some of the high-speed network technologies used in private and public data networks rounds off the segment.

Segment 4: The Internet

Students explore the basic protocol architecture of the Internet, comparing the TCP/IP protocol layers with the protocol layers proposed in the OSI model. An overview of the applications and underlying protocols used in the World Wide Web and Intranets, including the HTTP, FTP and SMTP protocols, enables students to understand the different Internet access technologies, such as ISDN, cable modem and XDSL.

Segment 5: Distributed Data Processing

Students learn to assess the network requirements of client-server computing through an analysis of the benefits and limitations of distributed computing. Issues related to user authentication and network access control prepare the groundwork for an evaluation of the Kerberos protocol. A discussion of the use of SNMP protocols to collect management information about the network enables students to assess the reliability of the network architecture and the need to manage the network infrastructure of an organisation.

Segment 6: Security Fundamentals

The segment introduces the basic principles of security, covering the concepts of confidentiality, integrity and availability. Risk management related to network security in an organisation is covered. The use of cryptographic algorithms and the concept of intrusion detection are explained, to enable students to evaluate the baseline security of an organisation's network infrastructure. Firewalls and Virtual Private Networks (VPNs) are also discussed.

Segment 7: Advanced Network Architecture

Advanced network architecture found in most medium and large organisations is the focus of the segment. Students examine the security implications of using remote access to an organisation's IT infrastructure; the use of extranets to streamline the communication of information; and the prevalence of new wireless technologies. A discussion of alternative solutions and security architectures to cope with the challenges of these advanced network architectures wraps up the segment.

Required textbook

Stallings, W. *Business Data Communications* (5th ed). New Jersey: Pearson Prentice Hall, 2005.

Global Faculty

U21Global subjects are created by acknowledged experts in their field, usually senior academics who have strong understanding of postgraduate requirements. The subject content is further reviewed by academic specialists who appraise the subject from an independent perspective, ensuring a high-quality, professional product.

Subject Author

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2620 DIGITAL COMMUNICATIONS, NETWORKS AND TECHNOLOGY was created for U21Global by **Tobias Ruighaver**, Senior Lecturer at the Department of Information Systems, University of Melbourne. He teaches Electronic Commerce Security in the Masters of Information Systems programme at the University of Melbourne and is the academic co-ordinator of the Graduate Certificate in e-Crime Investigations delivered by the University of Melbourne Private and the Victorian Police. He earned his PhD at the Technical University of Delft in the Netherlands.

Subject Reviewer

Professor Akkihebbal Ananda
National University of Singapore

The subject was reviewed by **Akkihebbal Ananda**, Associate Professor at the School of Computing, National University of Singapore. He is one of the key players in developing the university's campus-wide secure plug-and-play network, as well as the co-founder of Innvo Systems Pte Ltd, a spin-off company from the university's Centre for Internet Research. His research areas of interest include network and transport protocols, IPv4 to IPv6 transition mechanisms and distributed systems. Dr Ananda obtained his MSc and PhD degrees in Computer Science from the University of Manchester, UK.

Professors

Students' progress will be guided by dedicated Professor Facilitators based around the world. They provide an international perspective and impart knowledge through a wealth of experience in their field of specialisation. Our Professor Facilitators will help students make sense of the information to enable students to transform the information into knowledge and creative solutions.

France CHEONG

France Cheong is Senior Lecturer in the School of Business Information Technology at RMIT University in Melbourne, Australia. A former lecturer in the School of Computing Science at Queensland University of Technology, Dr Cheong was a Management Information Systems Consultant in Mauritius, from where he originates. His research interest lies mainly in the area of modelling and simulation of business and other systems, such as eBusiness, mobile commerce, economics and finance, management and manufacturing systems. He received his PhD in Computer Systems Engineering and Master of Computer Science from La Trobe University, Australia.