RW354
Principles of Computer Networking

A.E. Krzesinski and B.A. Bagula

Department of Computer Science

University of Stellenbosch

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- *Larry L. Peterson and Bruce S. Davie. Computer Networks: A Systems Approach (Third Edition). Morgan Kaufmann Publishers. ISBN 1-55860-577-0.*

- *William Stallings. Data and Computer Communications (Sixth Edition). Prentice-Hall Inc. ISBN 0-13-571274-2.*

- *Andrew S. Tannenbaum. Computer Networks (Fourth Edition). Prentice Hall Inc. ISBN 0-13-349945-6.*

Course Outcomes

This course is about the principles that underly the technologies and protocols used by current- and next-generation IP networks.

The student that passes this course on IP networks will become skilled in the following concepts

- *Basic networking ideas: various models of connectivity, resource sharing, support for common network services, network performance metrics, network architecture (layering & protocols), the OSI & the Internet architecture models.*

- *Connection-oriented (circuit switching) networks: Nyquist's sampling theorem, PCM, DS-1 transmission format.*

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Course Outcomes: Continued

- *Direct link networks: nodes, links, data encoding, framing & SONET, error detection, reliable transmission, ethernet, token ring & wireless networks (IEEE802.11).*

- *Connection-less (packet switching) networks: datagrams & virtual circuits, switching & forwarding, bridges & the spanning tree algorithm, asynchronous transfer mode (ATM), switch hardware.*

- *IP Internetworking: the best effort service model, addressing, packet forwarding, address translation (ARP & DHCP), error management (ICMP), virtual networks & tunnels, routing concepts including the RIP and OSPF algorithms, global internet addressing issues such as subnetting, classless routing (CIDR), network address translation (NAT), interdomain routing (BGP),IPv6 & several multicast protocols.*

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Chapter 1.1

Course Outcomes

- *End-to-end protocols: UDP, TCP concepts including connection management, sliding window & adaptive re-transmission.*

- *Congestion control & resource management: router scheduling (queueing) disciplines, TCP congestion control, congestion avoidance mechanisms & quality of service: Intserv and Diffserv mechanisms.*

- *End-to-end data: presentation formatting, data compression: JPEG, MPEG, MP3.*

- *Network security: cryptographic algorithms including DES, RSA & MD5, security mechanisms and examples of secure applications, firewalls.*

- *Applications: name service (DNS), traditional applications (SMTP, MIME, HTTP & SNMP) & multimedia applications.*

Course Outcomes

During the practical component (laboratory exercises) of the course you will

- *develop client-server applications on the Linux operating system using the IP, TCP and ICMP protocols.*