NEW ZEALAND INSTITUTES OF TECHNOLOGY AND POLYTECHNIC QUALIFICATIONS IN INFORMATION & COMMUNICATIONS TECHNOLOGY

PRESCRIPTION: DC700 DATA COMMUNICATIONS

AIM OF MODULE:	Students will gain an understanding of techniques used to compress data and to ensure network data integrity and security, and will extend their knowledge of data network protocols.
CREDITS:	7
KNOWLEDGE ASSUMED FROM:	DC600 Data Communications
STUDENT LEARNING HOURS:	70
CONTENT REVISED:	2010
PRESCRIPTION EXPIRY DATE:	November 2013

Level and Assessment Schedule

TOPICS	Highest Skill Level R	C	A	P	Suggested assessment Percentage
1. Network Integrity and Security				*	45
2. Data Network Protocols			*		55
					100

LEARNING OUTCOMES

The student will:

P 1 Explain how the integrity and security of data transmissions and the associated networks is ensured, how data is compressed and investigate the use of these techniques in a practical application.

A 2 Describe typical public data network protocols and use a protocol analyser to examine in detail the data link and network layers.

CONTENT

Access to synchronous data communications equipment and a protocol analyser is essential.

1 NETWORK INTEGRITY AND SECURITY

- An explanation of data integrity will include;
  a) Causes of errors on transmission media:
     - attenuation and distortion
     - methods of improving line quality

  b) Error detection/correction:
     - error detection methods including parity, block sum check (BCC) and cyclic redundancy check (CRC)
     - error correction methods including Forward Error Control (FEC); (eg. Hamming, and backward error control, including echo and Automatic Repeat Request (ARQ))

- An explanation of security will include:
  - data encryption methods; e.g. Data Encryption Standard (DES)
  - multi-user system dial-back
  - security e.g. 128 bit

- Data compression methods will include Huffman coding and current modem techniques; e.g. V.42bis and MNP.

- Investigation of these techniques will require monitoring network activity, identification of potential problems, including complete loss of the network, and documenting procedures for recovering a networked system.

2 DATA NETWORK PROTOCOLS

- Typical public data network protocols will include the following higher level data link control (HDLC) methods; SONET, long haul Ethernet, LAPB and LAPD associated with X.25 (PSN), Frame Relay systems and ISDN.

- Data link control protocol details will include; frame formats, transparency, error handling and retransmissions, implementation details and frame analysis.

- Network layer protocol details will include; packet formats, routing methods, implementation details and packet analysis.

- Investigation of the layered architecture of ATM, will include the lower layers unique to this high-speed transport technology.

- Investigation of the application of long haul Ethernet over fibre.