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

PRESCRIPTION: NE600 NETWORKS

AIM OF MODULE:	To enable students to describe and use ISO OSI Layer's 1 and 2 protocols to facilitate serial data communications over telecommunications networks.
CREDITS:	7
STUDENT LEARNING HOURS:	70
CONTENT REVISED:	2002
PRESCRIPTION EXPIRY DATE:	Nov 2011 (not currently offered by an ITP)

Level and Assessment Schedule

TOPICS	Highest Skill Level R	C	A	P	Suggested Assessment Percentage
1. Telecommunications Networks		*			25
2. Terminal Networks			*		25
3. Physical Layer Protocols			*		25
4. Line Control			*		25
					100

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LEARNING OUTCOMES

The student will:

C	1	Describe the various telecommunication networks and the services offered for digital communications
A	2	Describe and use a range of available facilities for supporting local and remote terminal networks
A	3	Describe and use a serial asynchronous data interface
A	4	Describe and use asynchronous and synchronous line control (OSI Layer 2) protocols

CONTENT

1 Telecommunications Networks

- A description of telecommunication networks and the services offered for digital communications will include:
  - Telecommunications providers
  - Leased lines and facilities
  - Value Added Networks
  - Public data networks including:
    - packet switched (PSN)
    - The Internet
    - ADSL offerings; e.g. Jet Stream and Tempest
    - Any others considered current and appropriate
  - Telephone networks including:
    - telephone networks (PSTN)
    - Integrated Services Digital Network (ISDN)
    - problems associated with the transmission of digital signals including A/D and D/A conversion
    - direct dialled connection (dial-up)
    - private permanent connection (leased line)
    - direct connection between sites

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2 TERMINAL NETWORKS

- A description of a range of facilities for supporting local and remote terminal networks and the use of these facilities will include:
  - Terminal connections, both local and remote and:
    - Multiplexers, including frequency division multiplexers (FDM's), time division multiplexers (TDM's), and statistical multiplexers (STATMUX's)
    - Data concentrators
    - Message switches
    - Front end Processors
    - ISPs and their function

3 PHYSICAL LAYER PROTOCOLS

- A description of a range of available facilities for supporting local and remote terminal networks and the use of these facilities will include:
  - the main signals used in EIA232 and V24, including (as a minimum) TXD, RXD, RTS/CTS, RTS, DTR, DSR, GND, and RLSD/CD and their operation when communicating via a modem
  - transmission delays incurred including:
    - modem turnaround
    - modem delay
    - reaction time
    - propagation delay
    - comparison of modulation techniques
  - illustrating timings for a typical transmission sequence
  - demonstrating the problems and providing the solutions for connecting EIA232/V24 devices, including:
    - connecting and using null modem cables
    - using a break-out box (or similar) to connect devices, including terminals and printers, to computers

4 LINE CONTROL

- A description and the use of asynchronous and synchronous line control protocols will include:
  - Connection establishment
  - Data transfer
  - Connection termination
  - Problem indicators
  - Flow control including Windowing and XON/XOFF
  - Polling, including roll call and hub polling

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(**Note**: Asynchronous protocols will include XMODEM, ZMODEM and/or any other appropriate protocols.
Synchronous protocols will include Character (Byte) oriented Binary Synchronous Communications and Bit oriented HDLC, SLIP, PPP and/or any other appropriate protocols).

NOTE

- Access to modems and break out boxes (or similar) are essential for this module
- Use HyperACCESS™ or other similar communications software

LEARNING RESOURCES

Suggested Textbooks:

- Forouzen, B. (2001) Data Communications and Networking 2nd Edition: McGraw-Hill

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