Demonstrate and apply knowledge of telecommunications network engineering principles

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<thead>
<tr>
<th>Level</th>
<th>6</th>
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<tbody>
<tr>
<td>Credits</td>
<td>15</td>
</tr>
</tbody>
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**Purpose**

This unit standard covers knowledge of telecommunications networks.

People credited with this unit standard are able to demonstrate knowledge of:
- the structure of telephony networks;
- access networks; and
- WANs.

**Subfield**

Telecommunications

**Domain**

Communications Technology

**Status**

Registered

**Status date**

18 December 2006

**Date version published**

18 December 2006

**Planned review date**

31 December 2011

**Entry information**

Open.

**Replacement information**

This unit standard replaced unit standard 11584.

**Accreditation**

Evaluation of documentation and visit by NZQA, industry and teaching professional in the same field from another provider.

**Standard setting body (SSB)**

ElectroTechnology Industry Training Organisation

**Accreditation and Moderation Action Plan (AMAP) reference**

0003


**Special notes**

1. This unit standard is intended for use in engineering courses at diploma level.
2 It is recommended that competency in Unit 11567, *Demonstrate knowledge of telecommunications network structures and transmission engineering*, be achieved before assessment against this unit standard is attempted, or equivalent knowledge and skills demonstrated.

3 Reference
Health and Safety in Employment Act 1992;
and all subsequent amendments and replacements.

4 Definitions
ADPCM – adaptive differential PCM.
ATM – asynchronous transmission protocol.
BGP – border gateway protocol.
Codec – coder/decoder.
DDS – digital data services.
DSL – digital subscriber line.
FR – frame relay.
GRE – generic route encapsulation.
HDLC – high level data link control.
HFC – hybrid fibre coax.
Industry practice – practice used and recommended by organisations involved in the electrotechnology industry.
IP – internet protocol.
IPLS – IP only LAN.
IPSec – IP security.
ISDN – integrated services digital network.
L2TP – layer 2 tunnelling protocol.
LAN – local area network.
MGCP – media gateway control protocol.
MPLS – multiprotocol label switching.
OSI – open systems interconnect.
PAM – pulse amplitude modulation.
PCM – pulse code modulation.
PDH – plesiochronous digital hierarchy.
PSTN – public switched telephone network.
RTCP – real-time transport control protocol.
RTP – real-time transport protocol.
SDH – synchronous digital hierarchy.
SIP – session initiation protocol.
SSL – secure sockets layer.
TCP/IP – transmission control protocol/internet protocol.
VPLS – virtual private LAN service.
VPN – virtual private network.
WAN – wide-area data network.

5 All measurements are to be expressed in Système International (SI) units, and, where required, converted from Imperial units into SI units.

6 All activities must comply with: any policies, procedures, and requirements of the organisations involved; the standards of relevant professional bodies; and any relevant legislative and/or regulatory requirements.
7 Range
   a performance in relation to the elements of this unit standard must comply with
       the Health and Safety in Employment Act 1992;
   b laboratory and workshop safety practices are to be observed at all times.

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Elements and performance criteria

Element 1

Demonstrate and apply knowledge of the structure of telephony networks.

Range PSTN, IP telephony.

Performance criteria

1.1 The components of the traditional PSTN are described in accordance with
       industry practice.
       Range may include but is not limited to – telephone, multiplexing, line
           interface circuit, time and space switching, digital trunks, types of
           call signalling.

1.2 The use of codec standards is described and their effect on digital bandwidth
       and latency compared.
       Range includes but is not limited to – PCM; ADPCM; ITU-T
           recommendations G.711, G.726, G.729.

1.3 Components and signalling protocols used in an IP telephony network are
       described in accordance with industry practice.
       Range may include but is not limited to – call processors, gateways,
           switches, routers, RTP, RTCP, MGCP, SIP, ITU-T
           recommendation H.248.
       Evidence of seven is required.

Element 2

Demonstrate knowledge of access networks.

Performance criteria

2.1 Access networks and associated protocols are described and compared in
       terms of coverage, data rates, network security, cost, and applications.
       Range may include but is not limited to – ISDN, DDS, DSL, HFC, fibre to
           the home/node, terrestrial wireless, satellite services.
Element 3

Demonstrate knowledge of WANs.

Performance criteria

3.1 Serial data communications are explained in accordance with industry practice.

Range asynchronous and synchronous communications, OSI 7-layer model with emphasis on layers 1-3, HDLC Layer 2 frame structure, TCP/IP, error detection and correction, encryption, data compression.

3.2 The general structure of wide-area data networks are described and compared in accordance with industry practice.

Range circuit, message and packet switching, FR, ATM, Ethernet in the WAN, SDH/PDH.

3.3 IP WAN switching technologies are explained in accordance with industry practice.

Range BGP/MPLS IP VPN's, Draft Martini, VPLS/IPLS, GRE, 802.1Q Tunnelling, IPsec, L2TP, SSL VPN's, Quality of Service.

Please note

Providers must be accredited by the Qualifications Authority, or an inter-institutional body with delegated authority for quality assurance, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be accredited by the Qualifications Authority before they can register credits from assessment against unit standards.

Accredited providers and Industry Training Organisations assessing against unit standards must engage with the moderation system that applies to those standards.

Accreditation requirements and an outline of the moderation system that applies to this standard are outlined in the Accreditation and Moderation Action Plan (AMAP). The AMAP also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

Comments on this unit standard

Please contact the ElectroTechnology Industry Training Organisation reviewcomments@etito.co.nz if you wish to suggest changes to the content of this unit standard.