



Australian Government

ICTRFN406 Maintain hybrid fibre coaxial broadband cable network

Release: 2

ICTRFN406 Maintain hybrid fibre coaxial broadband cable network

Modification History

Release	Comments
Release 2	This version released with ICT Information and Communications Technology Training Package Version 5.0.
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Application

This unit describes the skills and knowledge required to conduct routine maintenance tasks, analysing results and initiating corrective action.

It applies to individuals working as field officers from telecommunications carriers, service providers and contractors. They combine a broad range of optical and radio frequency (RF) technical skills with organisational skills to maintain the hybrid fibre coaxial (HFC) broadband cable network, generally with limited supervision and guidance.

Work functions in the occupational areas where this unit may be used are subject to regulatory requirements. Refer to the ICT Implementation Guide Companion Volume or the relevant regulator for details of licensing, legislative or certification requirements.

Unit Sector

Telecommunications – radio frequency networks

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Prepare for routine maintenance of	1.1 Obtain relevant legislation, codes, regulations and standards for given work

broadband cable network	1.2 Determine HFC network elements requiring maintenance and obtain maintenance details from various HFC manufacturer equipment manuals 1.3 Plan detailed routine maintenance schedule and discuss with all relevant personnel 1.4 Notify network operations centre (NOC) of proposed maintenance details and maintenance schedule 1.5 Assess potential impact of proposed maintenance on clients and network, and plan for minimal possible outage or deferral of maintenance 1.6 Obtain necessary tools and resources, and test equipment to undertake maintenance 1.7 Ascertain and record recent network stability and network performance
2. Undertake routine HFC network maintenance tasks	2.1 Conduct routine maintenance tasks according to documented enterprise instructions, following work health and safety (WHS) and environmental requirements, and record results 2.2 Protect network from excessive interference or degradation of service during maintenance routines 2.3 Monitor relevant alarms during running of maintenance tasks and report incidences to NOC 2.4 Escalate unresolved faults according to established enterprise procedure 2.5 Conduct performance measurements following routine maintenance schedule
3. Analyse results and initiate corrective action	3.1 Assess outcomes of performance measurements and maintenance routines to ensure they are according to specification 3.2 Analyse identified problems for likely impact and repair within capability, and initiate or escalate repair action where repair is beyond capability 3.3 Undertake outage if required in conjunction with NOC and according to prescribed enterprise outage plan 3.4 Record problems and incidences in maintenance log for future action as required by maintenance agreement 3.5 Verify alarms to ensure maintenance routines did not generate further problems

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Description
Reading	Recognises and interprets enterprise, regulatory and technical information from relevant sources to determine all specifications and frameworks
Writing	Uses clear, specific and industry related terminology to complete and update workplace documentation and in written communications to relevant personnel
Oral Communication	- Liaises with a diverse range of personnel to provide advice and guidance using relevant language - Uses listening and questioning techniques to confirm understanding
Numeracy	Interprets numerical information and applies basic calculations to conduct performance measurements
Navigate the world of work	- Takes personal responsibility for adherence to legal and regulatory responsibilities relevant to own work, with specific reference to safety and environmental requirements - Seeks advice from others when a situation becomes too complex to manage personally
Get the work done	- Determines job priorities, resources and equipment and works logically and systematically to undertake clearly defined and familiar tasks - Implements actions according to a predetermined plan, making slight adjustments if necessary and addressing some unexpected issues - Takes responsibility for routine decision making by selecting from a range of predetermined options in routine situations, identifying and taking situational factors into account - Responds to typical problems in different situations and implements standard solutions - Understands the purposes and specific functions of common digital systems and uses them effectively to complete routine tasks - Uses experiences to evaluate and identify improvements for future work

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
ICTRFN406 Maintain hybrid fibre coaxial broadband cable network (Release 2)	ICTRFN406 Maintain hybrid fibre coaxial broadband cable network (Release 1)	Updates to performance evidence and knowledge evidence. Updates to template to apply consistent format between units.	Equivalent unit

Links

Companion Volume Implementation Guides are available from VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2>

Assessment Requirements for ICTRFN406 Maintain hybrid fibre coaxial broadband cable network

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Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- determine the performance of and maintenance requirements for the hybrid fibre coaxial (HFC) broadband cable
- prepare a maintenance schedule and planned activities, and arrange resources
- carry out maintenance activities following appropriate procedures and techniques, using approved equipment where specified
- perform radio frequency (RF) and optical measurements and analyse results
- administer corrective measures where required, and verify and document actions
- comply with site risk control, work health and safety (WHS), environmental, quality and communication requirements.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- the following terms: 16 QAM, 64 QAM, 256 QAM
- relevance of alternating current (AC) and direct current (DC) electrical equipment in HFC broadband cable network
- forward error correction (FEC) and Reed-Solomon Code
- bit error ratio (BER) and acceptable values

- constellation diagrams
- digital modulation techniques
- Data Over Cable Service Interface Specification (DOCSIS) cable modem characteristics
- future broadband cable network (BCN) and migration to all-optical cable networks
- HFC broadband cable network principles, architecture and associated equipment
- minimum standards allowable in the return path for ingress
- optical fibre characteristics
- quadrature phase shift keying (QPSK)
- services carried on the HFC broadband cable network
- spectrum utilisation of the return path showing location of telephony and data channels, and signalling and test frequencies
- video stream transport formats including:
 - digital video broadcasting (DVB) - asynchronous serial interface (ASI)
 - high definition serial digital interface (HD-SDI)
 - motion picture experts group 2 (MPEG-2)
 - standard definition serial digital interface (SD-SDI)
 - modulation error ratio (MER) and acceptable values
- types of amplifier and placement in a HFC broadband cable network
- bi-directional RF amplifier and unidirectional RF amplifier
- eye diagram interpretation
- frequency spectrum and RF frequency plan HFC broadband cable network
- use of passive devices including filter, attenuator, power inserter, coaxial splitter, coupler, multitap and equaliser
- calculation of overall gain or loss when given signal levels in dBmV
- coaxial transmission line characteristics including cable tilt or slope
- forward path from head end to subscriber showing expected signal levels at key points
- power supply requirements in a HFC broadband cable network
- return path from subscriber to head end showing expected signal levels at key points
- RF amplifier characteristics including gain and tilt adjustment, equalisation and overload
- forms of ingress and where they may fall in the return path
- set up, operation and interpretation of test equipment for complex tests including:
 - optical time domain reflectometer (OTDR)
 - optical power meter
 - digital signal level meter
 - RF sweep equipment
 - spectrum analyser
- hand and power tools required to assemble and disassemble equipment in pits and in elevated work situations.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- sites on which HFC maintenance may be conducted
- maintenance tools and test instruments currently used in industry
- relevant regulatory, enterprise and equipment documentation that impact on maintenance activities.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guides are available from VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2>