



Australian Government

Department of Education, Employment and Workplace Relations

ICTRFN4158A Select an antenna system for radio communications

Release: 1

ICTRFN4158A Select an antenna system for radio communications

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit describes the performance outcomes, skills and knowledge required for the selection of an antenna system for radio communications to meet given performance requirements. This unit does not cover the estimation or analysis of radio signals within the desired area of coverage or over a specific radio path. This is covered in ICTRFN5179A Evaluate and analyse radio frequency (RF) signal coverage plots. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement but users should confirm requirements with the relevant federal, state or territory authority.
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Application of the Unit

Application of the unit	Technical staff from regulatory authorities or other private and public organisations apply the skills and knowledge in this unit. They combine technical radio communications skills with broader organisational and administrative skills to evaluate and select antenna systems in a range of commercial and community contexts. Technical staff may be responsible for small projects or parts of larger projects, and for the coordination and direction of small technical groups.
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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare to select antenna system	1.1. Establish extent of project from design brief or specification within a team environment 1.2. Obtain and review plans and drawings of existing or proposed installation site 1.3. Determine whether antenna system hardware requires a secure hut or shelter 1.4. Determine antenna requirements and antenna feedline requirements from design brief or specifications and research available commercial products 1.5. Determine earthing components to meet regulatory and earthing requirements of antenna system 1.6. Prepare the antenna feedline route to comply with job specifications and regulatory requirements 1.7. Identify installation options and assess against performance requirements and customer requirements
2. Select antenna system	2.1. Evaluate potential antenna system solutions which satisfy required performance, budgetary and regulatory requirements, and are suitable for installation in the specified environment 2.2. Make recommendations and select optimum antenna system
3. Document antenna system selection	3.1. Document calculations, final specifications and reasons for selection of antenna system 3.2. Prepare a final report, including documentation and drawings of selected antenna system and distribute to appropriate persons in accordance with enterprise policies and procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE
This section describes the skills and knowledge required for this unit.
Required skills
communication skills to liaise with internal and external personnel on technical,

REQUIRED SKILLS AND KNOWLEDGE

- operational and commercial matters
- literacy skills to:
 - interpret technical documentation
 - write final reports in required format
- numeracy skills to:
 - convert decibel gain values to ratios
 - evaluate and calculate effective isotropic radiated power (EIRP)
 - evaluate different types of technical data
 - interpret results
- planning and organisational skills to:
 - plan, prioritise and monitor own work
 - coordinate teamwork with others
- problem solving and contingency management skills to adapt requirements of particular sites and customers, and modify activities depending on differing operational contingencies, risk situations and environments
- research skills to examine and evaluate antenna patterns, specifications and data, and be able to synthesise antenna systems from commercially available products
- spatial skills to interpret and convert between two-dimensional and three-dimensional antenna patterns
- task management skills to work systematically with required attention to detail

Required knowledge

- antenna and propagation theory and industry practice
- antenna array theory
- transmission line theory and industry practice
- specific issues related to antenna installations and the creation of particular radiation patterns

Evidence Guide

EVIDENCE GUIDE	
The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the ability to: - select an antenna system - justify and document antenna system selection.
Context of and specific resources for assessment	Assessment must ensure: - antenna resources such as manufacturers' data sheets, specifications and catalogues - transmission line resources such as manufacturers' data sheets, specifications and catalogues.
Method of assessment	A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit: - direct observation of the candidate evaluating and selecting suitable antenna systems - review of reports completed by the candidate - oral or written questioning to assess knowledge of the selection of a radio communications antenna.
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example: - ICTRFN4095A Conduct radio frequency measurements - ICTRFN5179A Evaluate and analyse radio frequency signal coverage plots. Aboriginal people and other people from a non-English speaking background may have second language issues. Access must be provided to appropriate learning and assessment support when required. Assessment processes and techniques must be culturally

EVIDENCE GUIDE

	appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess required knowledge. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. Where applicable, physical resources should include equipment modified for people with special needs.
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Range Statement**RANGE STATEMENT**

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Antenna system may include:

- antenna array
- directional coupler
- duplexer
- earthing components
- ferrite isolator
- filter:
 - cavity
 - bandpass
 - band reject
 - low pass
 - stub
- lightning protection
- multiple feedlines
- phasing harness

RANGE STATEMENT	
	• single antenna • single feedline.
Antenna requirements may include:	• antenna height above ground • bandwidth: • specified in MHz • specified as % of centre frequency • beamwidth specifications in the: • E plane • H plane • front to back ratio: • gain: • dB_i • dB_d • minor lobes • mounting method • polarisation: • circular • horizontal • vertical • radiation pattern coverage: • bi-directional • irregular pattern • omnidirectional • unidirectional • radiation pattern specifications in the: • E plane • H plane • radome • shroud.
Feedline requirements may include:	• allowable loss in dB • characteristic impedance • mechanical characteristics • method of securing • RF connector type • weatherproofing.
Appropriate persons may include:	• customer • engineer • project manager

RANGE STATEMENT

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| | <ul style="list-style-type: none">• supervisor. |
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Unit Sector(s)

Unit sector	Telecommunications
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Co-requisite units

Co-requisite units		

Competency field

Competency field	Radio frequency networks
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