



Australian Government

Department of Education, Employment and Workplace Relations

ICTRFN5179A Evaluate and analyse radio frequency signal coverage plots

Release: 1

ICTRFN5179A Evaluate and analyse radio frequency signal coverage plots

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit describes the performance outcomes, skills and knowledge required to create radio frequency (RF) coverage plots and path profiles for point-to-point links and analyse data. 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, private and public organisations apply the skills and knowledge in this unit. They combine technical radio communications skills with organisational and administrative skills to generate and evaluate coverage maps 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. This unit applies to radio and television broadcasting, radio base station coverage, and point-to-point links.
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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. Plan and prepare for coverage prediction	1.1.Prepare for given work according to relevant legislation, occupational health and safety (OHS), codes, regulations and standards 1.2.Arrange access to the site according to required procedure 1.3.Establish type of coverage required 1.4.Determine specifications and the minimum acceptable signal level or timing signal delay within the coverage area 1.5.Use prediction software specific to the enterprise 1.6.Verify mapping coordinate system to be used 1.7.Create custom antenna pattern files representative of the expected antenna type for the type of coverage required
2. Load data into the software program and create coverage plot	2.1.Select and load system parameters 2.2.Select and load antenna elements or antenna pattern files 2.3.Select suitable propagation model settings applicable to the study 2.4.Load appropriate clutter properties 2.5.Create the coverage plot using appropriate plot options settings
3. Analyse coverage plot outcomes	3.1.Evaluate the initial coverage plot against initial specifications 3.2.Adjust system parameters and antenna elements until coverage plot is within specifications 3.3.Compare measured signal strength at various locations with the predicted values 3.4.Use measured data to correct and fine tune the model 3.5.Evaluate a range of possible solutions and make appropriate recommendations to ensure transmission meets operational requirements
4. Complete documentation	4.1.Tabulate results 4.2.Prepare report with final recommendations

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- analytical skills to:
 - be able to synthesise antenna systems from commercially available products
 - examine and evaluate antenna patterns, specifications and data
- communication skills to liaise with internal and external personnel on technical, operational and commercial matters
- literacy skills to:
 - interpret technical documentation
 - write final reports in required format
- numeracy skills to:
 - evaluate and convert RF field strength measurements
 - evaluate different types of technical data
 - interpret results
- planning and organisational skills to:
 - coordinate teamwork with others
 - plan, prioritise and monitor own work
- problem solving and contingency management skills to:
 - adapt requirements of particular sites and customers
 - modify activities depending on differing operational contingencies, risk situations and environments
- 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
- technical skills to select and use appropriate propagation models and practices to suit different situations

Required knowledge

- antenna and propagation theory
- antenna array theory
- overview of various mapping coordinate systems and their datums
- propagation models and their limitations in various environments
- 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:

- plan and coordinate activities to produce coverage plots using appropriate software settings
- generate:
 - an RF signal coverage plot
 - a path profile for a point-to-point link
- evaluate, analyse and make recommendations on antenna installation specifications.

Context of and specific resources for assessment

Assessment must ensure:

- access to computer facility on which coverage plots and paths may be generated
- use of propagation prediction software
- access to digital terrain database.

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 creating a coverage map and a point-to-point path profile
- review of reports completed by the candidate
- oral or written questioning to assess knowledge of the planning of terrestrial radio facilities using software.

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
- ICTRFN4096A - Conduct field tests of radio and wireless networks
- ICTRFN4158A Select an antenna system for radio communications.

Aboriginal people and other people from a non-English

EVIDENCE GUIDE

	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 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.

<i>Type of coverage</i> may include:	• directional pattern • omnidirectional • point to point.
<i>Prediction software</i> may include:	• ATDI • Atoll • CRC Predict • EDX

RANGE STATEMENT	
	• Planet EV • Radio Mobile • TEMS.
Mapping coordinate system may include:	• AGD-66 • AGD-84 • GDA94 • WGS-84.
System parameters may include:	• 'k' value • feeder loss • frequency • latitude and longitude • nominal receive antenna height • polarisation • site elevation • transmit antenna height above ground • transmitter power • transmitter site name.
Antenna elements may include:	• antenna gain (dBi) • broadside array of dipoles • collinear array of dipoles • dipole • dipole panel • half power beamwidth.
Propagation model may include:	• Egli • FCC point-to-point • International Telecommunications Union Radiocommunications sector (ITU-R) 1546 • ITU-R 1812 • ITU-R 525 • Longley-Rice • Okumura-Hata.
Clutter properties may include:	• average clutter height • buildings and trees • open • reflection coefficient of the land • RMS roughness of an area • suburban • urban.
Plot options may include:	• 0.6 First Fresnel zone clearance

RANGE STATEMENT

	• azimuth range or degrees • First Fresnel zone • first threshold level • path profile • polar plot • radial range (km) • radio horizon map • rainbow colour plot • second threshold level • signal strength prediction map • third threshold level • threshold units • timing signal delay study map.
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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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