UGL REGIONAL LINX

COMMUNICATION SYSTEM REQUIREMENTS

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CRN RS 018

LINKING COMMUNITIES. CONNECTING CUSTOMERS.

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Document Control

Function	Position	Name	Date
Approver	A&E Manager	Lucio Favotto	29.11.2021

Revision	Issue Date	Revision Description
2.1	10.11.2021	UGLRL Operational Standards Template applied
3.0	29.11.2021	First approved and issued UGLRL version

Summary of changes from previous version

Section	Summary of change
All	This document is based on the previous rail infrastructure maintainer (RIM). Full revision history is available on request from UGLRL
1	Punctuation correction

1 Introduction

Vehicles and trains operating on the CRN shall generate no energy capable of interfering with CRN signalling and/or communications equipment, other rolling stock.

1.1 Copper communication cables

Copper communications cables are primarily used for local distribution of services from nodes fed by optic fibre cables. These services include both telephone and digital data services.

Frequencies in use range from D.C. to 2 MHz plus harmonics.

1.2 Cable construction and installation

New cable is of unit twin, jelly filled construction, with a moisture barrier sheath but no screening. The capacitance unbalance to earth for these cables is typically less than 1%.

There is a small (and decreasing) amount of screened quad cable still in use.

In the Sydney metropolitan area many of the cable routes are above ground in troughing and drawings are not always available. Cable route plans of buried cables are available if required. Cable routes may be anywhere within (and at times are outside) the railway easement, but are typically close to the boundary fence line on one or both sides of the easement.

2 Railway radio systems

Radio systems and radio controlled equipment need to be considered from an interference viewpoint when proposing such systems for use on the CRN.

The following radio systems are being used or have been used in the past.

- MetroNet (Transponder or GPS) radio operates in the 403 – 420 MHz band on 12.5 kHz spaced analogue channels. This system has been replaced by DTRS.
- CountryNet radio has been previously used on the CRN, TfNSW and ARTC networks. This system has been replaced by the NTCS (National Train Communication System)
- WB is a simplex single analogue channel system operating at 450.05 MHz. This system is still operational for localised working.
- GRN operates in the 403 – 420 MHz band on 12.5kHz spaced analogue channels. This system has been replaced by DTRS.
- Police Radio operates in the 450 – 470 MHz band on 12.5kHz spaced analogue channels, migrating to digital.
- Station Radio operates in the 400 – 470 MHz band on 12.5kHz spaced analogue channels.
- Worksite Radio operates in the 450 – 470 MHz band on 12.5kHz spaced analogue channels.
- The DTRS (Digital train radio system) is a global system for mobile communications – railway (GSM-R) circuit switched system operates in the 1800 MHz band. When introduced this system will replace the MetroNet train radio system. The system operates in the following frequency bands: 1770 MHz – 1785 MHz, and 1865 MHz – 1880 MHz.
- National train communication system (NTCS) is a system designed primarily for use by freight and interstate locomotives for communications with train controllers across the interstate network. Additionally, freight locomotives are currently able to use the NTCS when operating on the Sydney metropolitan freight network. The NTCS system supports secure voice and data communications between train drivers and train controllers.

3 National train communication system (NTCS)

NTCS uses Telstra's NextG network for communications and Telstra's Iridium satellite network is used for redundancy. Telstra's NextG network is used for primary communications and if there is no NextG coverage then the system switches over to Iridium satellite.

All trains/locomotives are required to be fitted with appropriate ICE (In-cab Communications Equipment) radio to communicate on the NTCS. The ICE radio is also equipped with a GSM-R module to allow for communications with future GSM-R systems, including the TfNSW Digital Train Radio System, DTRS.

The NTCS/ICE radio system became operational in the TfNSW network in January 2011 and is used exclusively for train operations on the CRN.

Interference to and from external public carrier networks and other radio services should also be considered.

4 Interference tests

Type tests shall be conducted using the train set to measure vehicle generated disturbance effects in signalling track circuits, telecommunication cables and line side telecommunications systems.

Refer to Refer to CRN Standard CRN SD 026, Signal Design Principles - Rolling Stock Interface Requirements.

Appendix 1 CRN Rolling Stock Glossary

This appendix defines words that are used in the CRN Rolling Stock Standards

Agreed	Agreed between the Owner/Operator and the CRN Manager.
Approved	Approved by the CRN Manager.
Authorised person	Person authorised to travel in the cab of an infrastructure maintenance vehicle/train and stop the vehicle/train in the event of an emergency.
Cant deficiency	The difference in superelevation between: - that required to balance the actual vehicle centrifugal force due to curve negotiation such that there is equal wheel loading on the high and low rail, (equilibrium or balancing speed), and - the actual superelevation existing in the curve. Cant deficiency is a function of superelevation, curve radius and vehicle speed.
Continuous tractive effort	The tangential force that can be applied at the wheel/rail interface by a self powered vehicle for an indefinite period without causing wheel spin or overheating of the traction equipment.
CRN	Country Regional Network
Curved wheel web	Wheel web or plate which is domed such that its cross section is curved.
Design speed	The maximum speed at which a vehicle is expected to operate on the CRN
Driving trailer car	A passenger carrying vehicle that is non-powered but with a driving cab and operates in conjunction with one or more power cars and similar vehicles in a multiple unit consist
DTRS	Digital Train Radio System
Flat top trolley or trailer	A small non-powered infrastructure maintenance vehicle which is used for conveying tools and equipment along the track and which can be easily removed from the track.
Freight Train	A train predominantly consisting of freight vehicles.
Full supplies, Fully provisioned	Locomotive with all equipment and full of fuel, oil, water, coolant and sand.
GPS	Global Position System
Handbrake	A mechanical device provided on a train/vehicle in order to secure the train or an individual vehicle so as to prevent it from moving. Note: Where the term “handbrake” is used, it will also mean “parking brake”.
Heritage vehicle	Locomotive, passenger vehicle, freight vehicle or trolley that has historical significance and/or is not used in regular revenue service but used in special interest operations, such as steam tours.
ICE	In-cab Communications Equipment
Infrastructure maintenance vehicle	A rail bound self propelled vehicle which is used to carry out inspection and/or maintenance on railway infrastructure. Some of these vehicles may be removed from the railway track by the use of special take-offs or portable turnouts.
Light locomotive	One or more locomotives coupled together without hauled vehicles attached.

Locomotive	A self propelled vehicle, powered by any form of energy, which does not convey passengers or freight but which is used to move one or more other vehicles thus forming a train.
Multiple unit train	A distributed power train made up of similar electric or diesel powered vehicles and non-powered vehicles operating as a unit.
Net brake ratio	The ratio of the sum of the actual measured brake block forces divided by the total vehicle weight.
On-track infrastructure maintenance vehicle	Any infrastructure maintenance vehicle which operates exclusively on railway track.
ONRSR	Office of the National Rail Safety Regulator
Overhead wiring vehicle	An infrastructure maintenance vehicle with an elevating platform or equipped for maintenance of the overhead traction wiring system.
Power car	A self propelled vehicle, which may or may not convey passengers and/or freight, and operates in conjunction with similar vehicles in a multiple unit consist.
Quadricycle	A small self propelled rail-bound track vehicle which can be easily removed from the track.
Qualified worker	A worker certified as competent to carry out the relevant task.
Rail-bound infrastructure maintenance vehicle	An on-track infrastructure maintenance vehicle that cannot be removed from track without the use of a heavy crane. These vehicles are transferred around the network by rail.
Road/rail vehicle	Any type of track vehicle which can travel on either road or rail and can readily transfer from one mode of operation to the other.
Rolling Stock Exemption Certificate	A Certificate issued to a vehicle owner/operator covering vehicle non-conformances which are technically acceptable. These certificates remain in place for the life of the vehicle.
Rolling Stock Standards Waiver	A Waiver issued for a vehicle covering non-conformances that are deemed acceptable for a limited time period, until corrected.
Starting tractive effort	The tangential force applied at the wheel/rail interface that can be applied by self powered vehicle, to move itself and its trailing load from a stationary state without causing excessive wheel slip.
Straight wheel web	Wheel web consisting of a flat plate with no curvature such that its cross section is straight. Used primarily with wheel cheek mounted disc brakes
S-plate wheel	Wheel with a web such that its cross section forms an S shape, designed to provide low wheel rim stresses
Substantially modified vehicle	Vehicle modified to accommodate its use for a different purpose. Vehicle undergoing major refurbishment with updated equipment which can alter the braking, traction or suspension system performance. Vehicle being moved with equipment removed resulting in a reduction of vehicle mass that could alter the vehicle performance. Vehicle modified such that it may be incompatible with the infrastructure.
TfNSW	Transport for New South Wales
TOC Manual	CRN Train Operating Conditions Manual

TOC Waiver	An authority issued for the movement of a vehicle for which there are no published operating conditions, or for which the operating conditions are different from those published in the CRN Train operating Conditions Manual.
Track maintenance vehicle	Infrastructure maintenance vehicle used for the maintenance, construction or inspection of track.
Trailer car	A passenger carrying vehicle which is non-powered but operates in conjunction with one or more power cars and similar vehicles in a multiple unit consist
Train	One or more rail vehicles operating singularly or coupled together, hauled or self powered and capable of operating track signal circuits