

Network Switch, Router and Modem requirements for Signalling Applications

ESC-10-01

Applicability

ARTC Network Wide
SMS

Publication Requirement

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1 Introduction

1.1 Purpose

The purpose of this specification is to describe the requirements for Network Switches, Routers and Modems for Signalling applications for Australian Rail Track Corporation network.

Term 'Equipment' refers to Network Switches, Routers and/or Modem for the purpose of this document.

1.2 Scope

The scope of this document covers minimum ARTC requirements for

- a) Network switches
- b) Routers
- c) Modems

This specification is not intended to apply retrospectively however, it is a requirement that this specification shall apply for any future changes to existing infrastructure.

1.3 Document Owner

The General Manager - Technical Standards is the Document Owner. For any query, initial contact to be made at standards@artc.com.au

1.4 Responsibilities

The Business Unit Managers, Signal Maintenance Engineer, Project Manager, Project Signal Engineer, Control System engineer are accountable for implementation of this specification. This is necessary to ensure consistency, maintainability and reliability of the Signalling System.

The supplier is responsible for compliance and confirmation to this specification and applicable Australian and International standards.

1.5 Reference Documents

The following documents support this specification:

EN 61000 – Electromagnetic Compatibility

EN 60950 – Information Technology Equipment – Safety General Requirement

EN 50126 – Railway Applications – The specification and demonstration for Reliability, Availability, Maintainability and Safety (RAMS)

EN 50121 – Railway Application – Electromagnetic Compatibility

AS 7770 – Rail Cyber Security

IEC 60068 – Environmental Testing of Electrotechnical Products

IEEE 802.3 – Ethernet Standard

EN62311 - Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)

EN 301908 – IMT Cellular Networks

SPS01 – Standard requirements for Signalling Electronics System

SPS02 - Environmental Conditions

SPS 05 – Electrical and Electronic Components

ESD-09-01 – Signalling Power System

1.6 Definitions

The following terms and acronyms are used within this document:

Term or acronym	Description
ARTC	Australian Rail Track Corporation Ltd.
MTBF	Mean Time Between Failure
RCM	Regulatory Compliance Mark
Vital	Signalling equipment and circuits are considered vital where failure to function correctly could cause an unsafe outcome either directly or together with another signalling equipment or circuit failure.
Non-vital	Signalling equipment and circuits are considered non vital where failure to function correctly would not cause an unsafe outcome of the signalling system.
WHS	Work Health & Safety

2 Specifications

2.1 Standard Compliance

Equipment shall be manufactured and compliant to relevant Australian and International Standards. Manufacturer and/or supplier shall be able to demonstrate the compliance to the applicable standards.

2.2 Applications

Equipment shall be capable to be used on following application as required.

- Signalling Vital Communications
- Signalling Non-Vital Train Control Systems
- Network Diagnostics

Network Switches & Routers:

Only managed switches of layer 2 or layer 3 can be used on ARTC network. No unmanaged switches should be used on ARTC network for any future applications.

Network routers shall have the following security protection methods:

- Encrypted connections such as SSH or HTTPS protocol for remote management.
- Support for multiple administrative user accounts (no reliance on common credentials)
- Support for remote logging, audit trail and monitoring capability, such as syslog.
- Routers have capability to secure remote connections via IPSec encryption

Modem:

Where the modem is to be used as part of any other vital communications design, the safety critical aspects of the data transmission shall be managed by the vital communication inherent within the signalling devices and not the modems themselves.

Modems shall have a minimum transmission rate appropriate to achieve reliable system performance.

Modems should have capability to secure remote connections via IPSec encryption.

2.3 Quality Assurance

The equipment shall be manufactured in accordance with international quality standards of ISO9001 for which manufacturer should be accredited.

The MTBF for failures that would delay a train moving through the area covered by the equipment shall be more than 20 years. All equipment should be labelled with Regulatory Compliance Mark (RCM). Quality assurance statement from the manufacturer shall be available on request.

2.4 Connectivity

Equipment shall be able to provide options for connectivity as mentioned below as per requirement of intended application. Equipment shall be able to provide the redundant connectivity via different port or different connection method as per requirement.

- Ethernet

- Fibre
- Serial
- DSL
- Cellular (4G or later)
- Satellite

2.5 Configuration

Equipment shall be able to be configured as per required application. Configuration work instruction shall be developed by manufacturer/designer/contractor for ARTC staff.

Method of connection, configuration and network design shall ensure that delays or congestion incurred during data transfer is within the tolerances of the signalling equipment or train control system.

The configuration shall not be constrained by any proprietary protocols.

2.6 Ports

Selection of equipment shall consider the future expansion of the ARTC network. Number and types of ports in the equipment should be as per intended application. There shall be 10% of spare network ports to be available as minimum inside each location.

2.7 Alarms and Indications

Equipment shall have visual indications for healthy, unhealthy conditions for easy fault identification.

Alarms should be able to differentiate the critical and non-critical events. Equipment should be able to configure to send an alarm during power supply failure via available connection method to control centre or maintenance station.

As a minimum, the managed equipment shall support SNMP v2, for monitoring alarms and indications.

2.8 Power Supply

Equipment shall be able to operate from the available power range for ARTC network as per Signalling Power Systems ESD-09-01.

2.9 WHS

Equipment shall be assessed for WHS issues. Any new issue shall be actioned appropriately to minimize the consequence as per SFAIRP practice.

2.10 Mounting

Equipment shall have suitable mounting options to allow the installation on DIN rail, 19" rack, wall rack and as per other ARTC mounting requirement. Mounting of equipment shall be in such a way that it does not create any earth fault.

2.11 Environmental

Operating temperature of the equipment, used in trackside locations subject to environmental conditions, shall be from -20 to +70°C with minimum of IP30 protection including relative humidity 0 to 90%.