Signal and Communication System Configuration Control

Abstract: This recommended practice provides guidelines for rail transit signal and communication system configuration control.

Keywords: change, communication, configuration control, document, revision, signal, software

Summary: The configuration control procedures in this recommended practice include document configuration control, software development configuration control and fully developed software configuration control.

Foreword

The American Public Transportation Association is a standards development organization in North America. The process of developing standards is managed by the APTA Standards Program's Standards Development Oversight Council (SDOC). These activities are carried out through several standards policy and planning committees that have been established to address specific transportation modes, safety and security requirements, interoperability, and other topics.

APTA used a consensus-based process to develop this document and its continued maintenance, which is detailed in the [manual for the APTA Standards Program](#). This document was drafted in accordance with the approval criteria and editorial policy as described. Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

This document was prepared by the Signals and Communication Working Group as directed by the Rail Standards Policy and Planning Committee.

This document represents a common viewpoint of those parties concerned with its provisions, namely transit operating/planning agencies, manufacturers, consultants, engineers and general interest groups. The application of any recommended practices or guidelines contained herein is voluntary. APTA standards are mandatory to the extent incorporated by an applicable statute or regulation. In some cases, federal and/or state regulations govern portions of a transit agency's operations. In cases where there is a conflict or contradiction between an applicable law or regulation and this document, consult with a legal adviser to determine which document takes precedence.

This document supersedes APTA RT-SC-RP-037-03, which has been revised. Below is a summary of changes from the previous document version:

- Migration to the new 2025 APTA document template which standardizes and reorganizes the document's content; a document summary and foreword were added; the scope and purpose have been combined and updated to be more specific.
- Updated list of participants.
- Updated definitions, abbreviations and acronyms to be consistent with standard definitions; specifically, RTS has been replaced with rail transit system throughout the document.
- Document sections renumbered to simplify the referencing of content
- Reference to the use of the AREMA C & S manual was updated.

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Introduction

This introduction is not part of APTA RT-SC-RP-037-03, "Signal and Communication System Configuration Control."

APTA recommends the use of this document by:

- individuals or organizations that operate rail transit systems;
- individuals or organizations that contract with others for the operation of rail transit systems; and

- individuals or organizations that influence how rail transit systems are operated (including but not limited to consultants, designers and contractors).

Scope and purpose

This recommended practice provides guidelines for the configuration control of rail transit signal and communication systems, including documentation that describes the current versions of hardware, firmware and software. The purpose of this recommended practice is to provide guidelines for accurately documenting signal and communication system configurations, thereby increasing reliability and reducing risks of hazards and failures. This recommended practice covers key elements of software development configuration control but does not attempt to cover all aspects of this complex subject.

Signal and Communication System Configuration Control

1. Configuration control provisions

1.1 Configuration control frequency

The configuration control procedures in this recommended practice should be performed when signal and communication systems are placed in service; when they are modified, repaired or disarranged; or as otherwise deemed necessary by the rail transit agency.

The rail transit agency should determine the need for additional inspection and testing frequencies for signal and communication systems. A review of the following factors may be useful in making this assessment:

- OEM-recommended intervals
- industry experience
- operating environment/conditions
- historical data
- reliability-centered maintenance program development
- failure analysis
- rail transit agency testing and experience
- regulatory requirements

The frequency of tasks should comply with applicable federal, state and local regulations.

1.2 Training

The rail transit agency and/or its maintenance contractors should develop and execute training programs that provide employees with the knowledge and skills necessary to safely and effectively perform the tasks outlined in this recommended practice.

1.3 Materials

No consumable materials are recommended for signal and communication systems configuration control unless otherwise specified by the OEM and/or rail transit agency.

1.4 Tools

The following tools are recommended for signal and communication systems configuration control:

- software configuration control tool
- computer
- rail transit agency–approved portable radio
- standard tools carried by maintenance personnel
- additional tools as recommended by the OEM and/or rail transit agency

1.5 Personal protective equipment

Personal protective equipment, as required by the rail transit agency, should be worn at all times during configuration control.

1.6 Safety

Rail transit agency safety rules, procedures and practices shall be followed at all times during configuration control.

1.7 Configuration control procedures

The configuration control procedures in this recommended practice may be modified for each rail transit agency's requirements but should contain the steps listed in sections 1.7.1 through 1.7.3 as a minimum.

1.7.1 Document configuration control

1. Develop a formal document change management process that includes a configuration control board and clearly defines roles and responsibilities. Interfaces to external systems will be captured in interface control documents.
2. Develop a procedure to ensure that configuration control is secure and prevents unauthorized access to documents under configuration control.
3. Establish a process for uniquely identifying each document.
4. Develop a standard format for document types, including CAD software, text and graphics format, locations for identification and standard data, revision identification, and symbol conventions. Suppliers should be required to furnish documents in rail transit agency formats.
5. Develop change control processes to ensure that:
    a. all changes to documents are identified;
    b. the change has been approved by the proper authority;
    c. the accuracy of the changes is verified;
    d. dates of changes and implementation are identified; and
    e. the reason for the changes is recorded.
6. Establish a document retention schedule to define a document's useful life. The retention schedule should consider legal as well as technical issues.
7. Establish a distribution process to ensure that:
    a. documents are available to their users;
    b. users are notified of revisions;
    c. users can determine the applicable documents; and
    d. obsolete documents are removed from service or field locations.
8. Develop a standard storage and retrieval process, especially for electronic media.
9. Create and store duplicate copies of documentation in a location separate from the main document repository.

1.7.2 Software development configuration control

The software configuration control procedures listed below apply whether software is developed in house or is purchased commercially.

1. Develop a procedure to ensure that configuration control is secure and prevents unauthorized access to software being developed.
2. Develop a formal software change management process that includes a configuration control board that clearly defines roles and responsibilities.

3. Develop change control processes to ensure that:
   a. the change has been approved by the proper authority;
   b. the accuracy of the changes is verified;
   c. dates of changes and implementation are identified;
   d. changes within software code are clearly identified and documented; and
   e. the reason for the changes is recorded.
4. Establish a reliable naming and numbering process for identifying software, directory structure and version. The process should identify all source codes for each version and the compiling tools used.
5. Utilize a software configuration control tool.
6. Develop a process to track problems and their resolutions.
7. Document test results.
8. Establish a version compatibility matrix to identify which hardware configurations the software version is compatible with.
9. Place fully developed software under configuration control as described in Section 1.7.3.

1.7.3 Fully developed software configuration control

The software configuration control procedures listed below apply when the software is fully developed and relatively static. See Section 1.7.2 for configuration control of software under development.

1. Develop a procedure to ensure that configuration control is secure and prevents unauthorized access to software under configuration control.
2. Establish a master record of all in-service software.
3. Software identification should include the system(s) it is used in, version, version date and in-service date.
4. Develop standard archiving storage and retrieval processes.
5. Create and store duplicate copies of software in a location separate from the main software repository.
6. The rail transit agency should obtain all source code and compiling tools. In the event that a vendor can no longer support a product or the rail transit agency intends to modify the software, these materials should be escrowed to ensure availability under preestablished conditions.
7. Establish an audit process to ensure that proper baseline software is delivered by vendors and that in-service software is under configuration control.
8. Develop formal firmware programming procedures to produce copies from archive files or master copies of firmware.
9. Label firmware with name, revision level, revision date, checksum value and socket location on printed circuit card, e.g., U32.
10. Establish a distribution process to ensure that:
    a. software is available to the users;
    b. users are notified of software revisions;
    c. users can determine the applicable software; and
    d. obsolete software/firmware is removed from service or field locations.

Refer to APTA RT-SC-S-035-03, "Vital Processor Based Systems Inspection, Testing and Configuration Control," and APTA RT-SC-RP-030-03, "Non–Vital Processor Based Systems Inspection, Testing and Configuration Control," for software configuration control requirements for those systems.

1.8 Correction of deficiencies

Deficiencies identified during signal and communication system configuration control should be corrected and documented in accordance with OEM and/or rail transit agency requirements.

1.9 Documentation

Configuration control activities should be documented, reviewed and filed in accordance with rail transit agency procedures.

Related APTA standards

APTA RT-SC-S-035-03, "Vital Processor Based Systems Inspection, Testing and Configuration Control"

References

In addition to the following document, this recommended practice should be used in conjunction with OEM specifications and rail transit agency procedures for signal and communication system configuration control.

The most recent edition of the AREMA communication and signals manual should be used in conjunction with this recommended practice.

Definitions

configuration control: A process to ensure that all documentation that describes a system and its various components is current and reflects the actual functional and physical characteristics of the system throughout its life cycle.

firmware: A device that is programmed with instruction set software and installed in a processor-based system, e.g., EPROM.

hazard: Any real or potential condition that can cause injury, death or damage or loss of equipment or property.

interface control document: A document that defines the relationship between software and hardware configurations.

operations control center (OCC): One or more central locations designed, equipped and staffed for the purposes of monitoring and controlling rail transit agency activities. Also called *rail control center*, *rail operations center*, *rail service control center*.

original equipment manufacturer (OEM): The enterprise that initially designs and builds a piece of equipment.

rail transit agency: The organization or portion of an organization that operates rail transit service and related activities. Also called *operating agency*, *operating authority*, *transit agency*, *transit authority*, *transit system*.

version compatibility matrix: The document that defines the compatibility of a software version with hardware configurations.

Abbreviations and acronyms

CAD   computer-aided design
OCC   operations control center
OEM   original equipment manufacturer

Document history

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