



# Course Catalog

*POSITIVE TRAIN CONTROL (PTC) 220 MHZ*



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# MCC Course Level Definitions

- **Level 100: Knowledge and Comprehension**
  - Entry level courses often have few or no prerequisites and are well suited to support overviews and introductions of new subject matter.
- **Level 200: Application and Analysis**
  - Intermediate level courses usually require some background or prerequisite knowledge and skills.
- **Level 300: Synthesis and Evaluation**
  - High level courses will push learners to expand upon the subject matter and extrapolate new solutions based on old concepts.

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# ITCM Courses

Course	Format
Introduction to ITCM Architecture	eLearning
Introduction to the ITCM Deployment Tool and Configuring ITCM Topologies	Distance Learning
Introduction to the ITCM Deployment Tool and Configuring ITCM Topologies	Instructor Led



## ITCM Architecture Overview

eLearning Course 8A00604



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# ITCM Architecture Overview

eLearning Course 8A00604

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# ITCM Architecture Overview

## ➤ Description

— This 100-level , eLearning course is designed to introduce all Interoperable Train Control Messaging (ITCM) personnel to ITCM. This course covers:

- Introduction to ITCM
- Basic AMQP concepts
- Basic messaging concepts
- System components
- Message flow through the system.

## ➤ Format: Self-paced eLearning

## ➤ Duration: Approximately 3 hours

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# Prerequisites

- Before taking this course, it is recommended that learners:
  - Complete the Positive Train Control (PTC) Overview course.
  - Be able to describe the Rail Safety Improvement Act of 2008

# Audience

- This course is recommended for learners responsible for ITC Messaging in one or more of the following areas of concentration:
  - Planning and Architecture
  - Configuration and Performance
  - Back Office, Waysides, or Locomotives
  - Other roles supporting PTC

# Learning Objectives

- After completing this course, learners will be able to:
  - Explain what the Interoperable Train Control Messaging (ITCM) is
  - Describe the basic Advanced Message Queuing Protocol (AMQP) Application concepts
  - Describe basic messaging concepts
  - Describe the ITCM system components
  - Describe how messages flow through the ITCM system.

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# Introduction to the ITCM Deployment Tool and Configuring ITCM Topologies

Distance Learning Course 8A00404

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# Introduction to ITCM Deployment Tool

## ➔ Description

This distance learning, 300-level course provides an introduction to the ITCM Deployment Tool and includes an overview of the product as well as a number of examples and tutorials to help learners write and maintain deployment topology models. Demonstration movies remain available to learners once the course is complete.

➔ Format: Instructor-led distance learning

➔ Duration: 5 days, 4 hours per day

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# Prerequisites

- Before taking this course, it is recommended that learners:
  - Be able to use basic Linux/Unix commands.
  - Be able to:
    - Use vi
    - Access log files
    - Navigate the file system
    - Change permissions
- Have successfully completed the following courses:
  - ITCM Architecture Overview course
  - Positive Train Control (PTC)
- Be able to describe the importance of the Rail Safety Improvement Act of 2008

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# Audience

- This course is intended for learners who are responsible for ITC Messaging in one or more of the following areas:
  - Planning and Architecture
  - Configuration and Performance
  - Back Office, Waysides, or Locomotives
  - Other roles supporting PTC

# Learning Objectives

- ◆ After completing this course, learners will be able to:
  - Define a back office
  - Configure remote areas
  - Configure the Advanced Message Queuing Protocol (AMQP) Application
  - Configure ITCM to communicate over a radio transport
  - Show how the ELM handles the base radio failover and handoff capabilities
  - Federate multiple back offices
  - Configure cost maps
  - Filter transport network updates
  - Add special handling
  - Configure trace and usage log messages
  - Create, store, and load kits
  - Program within the model file
  - Configure security
  - Deploy clustering for high availability

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# Introduction to the ITCM Deployment Tool and Configuring ITCM Topologies

Instructor-Led Training 8A00804



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# Introduction to the ITCM Deployment Tool and Configuring ITCM Topologies

Instructor-Led Training 8A00804

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# ITCM Deployment Tool

## ➤ Description

This instructor-led, 300-level course provides an introduction to the ITCM Deployment Tool and includes an overview of the product as well as a number of examples and tutorials to help learners write and maintain deployment topology models. Demonstration movies remain available to learners once the course is complete.

➤ Format: Instructor-led with eLearning components

➤ Duration: 2½ days

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# Prerequisites

- Before taking this course, it is recommended that learners:
  - Be able to use basic Linux/Unix commands.
  - Be able to:
    - Use vi
    - Access log files
    - Navigate the file system
    - Change permissions
- Have successfully completed the following courses:
  - ITCM Architecture Overview course
  - Positive Train Control (PTC)
- Be able to describe the importance of the Rail Safety Improvement Act of 2008

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# Audience

- This course is intended for learners who are responsible for ITC Messaging in one or more of the following areas:
  - Planning and Architecture
  - Configuration and Performance
  - Back Office, Waysides, or Locomotives
  - Other roles supporting PTC

# Learning Objectives

- ◆ After completing this course, learners will be able to:
  - Define a back office
  - Configure remote areas
  - Configure the Advanced Message Queuing Protocol (AMQP) Application
  - Configure ITCM to communicate over a radio transport
  - Show how the ELM handles the base radio failover and handoff capabilities
  - Federate multiple back offices
  - Configure cost maps
  - Filter transport network updates
  - Add special handling
  - Configure trace and usage log messages
  - Create, store, and load kits
  - Program within the model file
  - Configure security
  - Deploy clustering for high availability

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# Radio Courses

Course	Format
PTC 220 MHz Radio	Instructor Led
ITCR Channel Management	Instructor Led
PTC Field Radio	Instructor Led
PTC Field Radio Review (New)	eLearning
PTC Overview	eLearning

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## PTC 220 MHz Radio

Instructor-Led Training 8A00504



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# PTC 220 MHz Radio

Instructor-Led Training 8A00504

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Radio

# PTC 220 MHz Radio

## ➤ Description

This instructor-led, 200-level course provides an explanation and demonstration of how to inspect, configure, and operate PTC 220 MHz radios. Learners engage in hands-on activities with on-site coaching.

➤ Format: Instructor-led training

➤ Duration: 2 days

# Prerequisites

- Before taking this course, it is recommended that learners:
  - Understand the importance of PTC and the Rail Safety Improvement Act of 2008
  - Have basic computer literacy
  - Have successfully completed the following courses:
    - XtermW (Note: presently included in this course)
    - ITCR Channel Management (Note: presently included in this course).

# Audience

- This course is intended for learners who are responsible for some aspect of operating Wayside, Base, and/or Locomotive radios.
- It is beneficial if learners have experience with:
  - Scripting
  - Creating macros

# Learning Objectives

- ◆ Given an explanation and demonstration of how to inspect, configure and operate PTC 220 MHz radios, learners will gain an overview and practice in:
  - XtermW (**Note: This training is currently included in this course**)
  - Incoming Inspection Demonstration and Performance
  - ITCR Channel Management (**Note: This training is currently included in this course**)
  - Configure Radios for System Networking
  - Verify Configuration with XtermW
  - Configuration Information Module (CIM)
  - Apps Management
  - Perform Radio Configuration for RTCS
  - Sniffer Usage and Diagnostic Methods



## ITCR Channel Management

eLearning Course 8A00304



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# ITCR Channel Management

eLearning Course 8A00304

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# ITCR Channel Management

## ➤ Description

This eLearning, 100-level course covers ITC Frequency Channels and Radio Channel Configuration as well as FTDMA Slot and Frequency Assignment.

➤ Format: Self-paced eLearning

➤ Duration: Approximately 2 hours

# Prerequisites

- Before taking this course, it is recommended that learners:
  - Understand the importance of PTC and the Rail Safety Improvement Act of 2008.
  - Have basic knowledge of wireless communication, including multiple access techniques (TDMA and FDMA).
  - Have previous knowledge or exposure to cellular network planning.
  - Have basic computer literacy.
  - Have access to the Internet.

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# Audience

- This course is intended for learners who are responsible for some aspect of operating Wayside, Base, and/or Locomotive radios.
- It is beneficial if learners have experience with:
  - Scripting
  - Creating macros
  - TCP/IP networking

# Learning Objectives

- After completing this course, learners will be able to:
  - Identify in MHz the receive/transmit frequency supported by all ITC radios.
  - Identify in MHz the FCC-certified frequency range for ITC radios.
  - Describe the difference between the common channel and local channels.
  - Define the common channel and give two scenarios where it is used.
  - Define a local channel and give an example of where it is used.
  - Describe the difference between FTDMA and DTDMA and define each.

# Learning Objectives, continued

- After completing this course, learners will be able to:
  - Describe the difference in channel capacity between base, locomotive, and wayside radios to receive a signal.
  - Describe the purpose of the neighbor list.
  - Describe how base, locomotive, and wayside receivers are configured for frequency channel use.
  - Define two-dimensional planning and give an example of when to use it.
  - Describe the wayside status delivery mechanism from the WIU to the TMC

# Learning Objectives, continued

- After completing this course, learners will be able to:
  - List the properties of a superframe and explain when to use a standard and extended FTDMA frame.
  - Define the term "deaf locomotive" and describe its cause. Give a solution that would prevent deaf locomotive.
  - Describe the relationship between the recommended FTDMA slot, the number of slots, time guards, and FTDMA frame length.
  - Describe the 7-1 design method.
  - Describe the 6-1-1 design method.



## PTC Field Radio

Instructor-Led Training 8A00104



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# PTC Field Radio

## Instructor-Led Training 8A00104

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# PTC Field Radio

## ➤ Description

This instructor-led, 300-level course gives learners information and practice on installing and commissioning Base and Wayside PTC 220 MHz radios. Learners gain practice in how to survey the radios, antennae, and their peripherals. They will also receive training on installing equipment, running tests, and configuring the PTC 220 MHz radios.

➤ Format: Instructor-led training

➤ Duration: Two days

# Prerequisites

## ➤ Audience

- Learners should understand the importance of PTC and the Rail Safety Improvement Act of 2008.
- Learners need basic computer literacy.

## ➤ Recommendations

- Learners must be railroad operatives involved with some aspect of operating Wayside, Base, and/or Locomotive radios.
- It is beneficial if learners have experience with:
  - Scripting
  - Creating macros

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# Learning Objectives

- ◆ After completing this course, learners will be able to:
  - Define PTC-220 and describe its primary purpose.
  - Describe the primary mission and secondary missions of PTC.
  - Define the term Superframe and describe its components.
  - Describe the purpose of the F-frame.
  - Describe the purpose of the D-frame and its relationship to the F-frame.
  - Define the term GPS and describe what it does.
  - Describe the significance of “sky aperture” to radio installation and troubleshooting.
  - Explain why waysides and base radios require GPS.
  - Define the terms “almanac data” and “ephemeris data” and describe how they are different.

# Learning Objectives, continued

- After completing this course, learners will be able to:
  - Define dilution of precision and explain why it is important.
  - Explain the difference between acquiring a GPS signal and sustaining it.
  - Identify the three most common coordinate systems and explain the significance of using the appropriate formatting.  
Given a Google Earth print of a known location, the learner will orient the print to true North.
  - Explain the purpose of using Google Earth to locate a field position to conduct a field survey.
  - Given a handheld GPS receiver, the learner will power on and acquire satellite readings at a known location to establish a fix.

# Learning Objectives

- After completing this course, learners will be able to:
  - Given a Google Earth print oriented to true North, the learner will use the “fist” method to measure physical obstructions in a known location.
  - Given a handheld GPS receiver, polar coordinate paper, and a writing tool, the learner will accurately record measurements of physical obstructions.
  - Given a sketch of physical obstructions on polar coordinate paper from a known location, the learner will accurately enter data in Trimble Mission Planner.
  - Give Trimble Mission Planner, the learner will identify best and worst dilution of precision readings for a known location.
  - Given Trimble Mission Planner data and a Google Earth print of a known location, the learner will describe factors in the physical environment that can negatively impact dilution of precision readings and GPS antenna effectiveness.



## PTC Field Radio Review

eLearning 8A02204



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# PTC Field Radio Review (New)

eLearning 8A02204

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Radio

# PTC Field Radio Review

## ➤ Description

- This 100-level course is a review course for field radio installers and railroad personnel who have attended the instructor-led Field Radio course.
- Format: Self-paced eLearning with 10 simulations
- Duration: 2 to 4 hours

# Prerequisites

- Before taking this course, learners must take the PTC Field Radio course.

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# Audience

- This course is intended for radio installers and railroad professionals

# Learning Objectives

- After completing this course, learners will be able to:
  - Define the term Superframe and describe its components.
  - Describe the purpose of the F-frame.
  - Describe the purpose of the D-frame and its relationship to the F-frame.
  - Define the term GPS and describe what it does.
  - Describe the purpose of operational advisories and service interruption notices.
  - Describe the purpose of operational advisories and service interruption notices.

# Learning Objectives, continued

- After completing this course, learners will be able to:
  - Explain the significance of GPS satellite service interruptions to PTC 220 installations.
  - Identify the three most common coordinate systems and explain the significance of using the appropriate formatting.
  - Define the term “datum” and give an example.
  - Given a Google Earth print of a known location, the learner will orient the print to true North.
  - Explain the purpose of using Google Earth to locate a field position to conduct a field survey.
  - Given a handheld GPS receiver, the learner will power on and acquire satellite readings at a known location to establish a fix.

# Learning Objectives, continued

- After completing this course, learners will be able to:
  - Given a Google Earth print oriented to true North, the learner will use the “fist” method to measure physical obstructions in a known location.
  - Given a handheld GPS receiver, polar coordinate paper, and a writing tool, the learner will accurately record measurements of physical obstructions.



# PTC Overview

eLearning Course



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# PTC Overview

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# PTC Overview

## ➤ Description

This self-paced eLearning, 100-level course is recommended for all PTC personnel as a starting point for understanding the need for PTC, the intent of the overall PTC program, and how interoperability is essential for a closed-loop, fail-safe program.

## ➤ Format: Self-paced eLearning

## ➤ Duration: 2 to 4 hours

# Prerequisites

- Before taking this course, it is recommended that learners:
  - Have access to the internet.

# Audience

- This course is intended for learners who are responsible for PTC in one or more of the following areas of concentration:
  - Planning and Architecture
  - Configuration and Performance
  - Back Office, Waysides, or Locomotives

# Learning Objectives

- After completing this course, learners will be able to:
  - Associate various PTC-related topics to those required for a successful PTC program.
  - Topics will include:
    - ITCC Background
    - Rail Safety Act of 2008
    - PTC Benefits
    - 49 CFR 236; training related requirements
    - Communication Systems



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