



Digital Intelligence

Train Management & Dispatch System



TMDS is a fully-integrated computer aided dispatch (CAD) solution that provides all the essential tools required to manage train operations that are related to the most train operation types like Continuous Track Circuit / Track Warrant Control Areas. The tools are provided through a combination of software and hardware solutions that are organized into a collection of services.

CAD is a fully-integrated, highly configurable, state-of-the-art solution that provides all the essential tools required to manage train operations in various territories. CAD is a graphical track-line user interface that provides a fully integrated view of all the territory types. It includes / integrates both CTC and TWC territories together to seamless train identification tracking while providing the flexibility to use other features that are essential, but unique, to both types of operations.

Centralized Traffic Control Functionalities

- Field Device Control
- SCADA Operation
- CTC Validation Checking
- Entry/Exit Routing
- Device Blocking
- Stored Routes
- Authorities & Restriction Issuance

Field Device Control

Controls are generated from a dispatcher workstation or a designated administrative workstation from the selection and de-selection of controllable devices on the graphical user interface. Controls are sent to the code server where they are routed to the appropriate packet switch for delivery and confirmation of delivery to the field control points.

TMDS allows for the processing of indications received from field devices. Indications are the messages received from field devices that describe the state of these field devices at the current point in time. Aside from common indications like track, signals and switches, TMDS is able to process indications for miscellaneous devices and indications that do not directly correspond to a device in the office database.

SCADA Operation

SCADA is Supervisory Control & Data Acquisition.

CAD is capable of controlling the SCADA devices like brakes & switches to ensure the distribution of the traction power to the field.

CTC Validation Checking

Request Ordering:

TMDS supports operation with composite and non-composite field devices. TMDS allow an authorized user to issue control requests that are not valid until other control requests that are also being made have returned an indication that they have completed. TMDS hold these invalid control requests until they become valid. They will then be sent to the field.

Manually Issued Control Requests:

TMDS provides the capability for an authorized user to control signal field devices. The authorized user may select a device and an action to perform on that device. TMDS converts this to a control request. TMDS validates all control requests when they are made. It stores each in a set until they are transmitted to the field. Prior to transmitting, TMDS again validates the control requests.

Automatically Issued Control Requests:

TMDS automatically generates certain control requests. It generates control requests based on certain events that take place in the field.

Entry/Exit Routing

By selecting a route entrance, zero or more intermediate points, and a route exit, TMDS automatically generates a route between two points.

As the route parameters are entered, TMDS dynamically creates a route between the entry, intermediate, and exit points.

TMDS generates a route using the preferred routes defined in the database and a shortest path algorithm. This ensures that the route selected is the most preferred route. Once a route is generated, it is presented to the authorized user for acceptance.



Device Blocking

Blocking can be applied to switches, Signals, Track and Miscellaneous Devices.

Within CTC and Manual Interlocking Territory, blocking is a safety measure that prevents authorities from being generated and field devices from being controlled from the office.

Office blocking is where TMDS prevents, a control request from being sent to a device. If the device under office blocking supports field blocking, TMDS automatically sends a field block command that prevents the device from being used until the field block is removed.

Stored Routes

When a route cannot be lined immediately, TMDS optionally stacks the entire route. In order to stack a route, it is broken into route segments, which are smaller routes. Each segment spans exactly one control point. There are primarily two methods of storing a stacked route: first availability or sequence.

First Availability mode will line the first route that becomes available at a control point regardless of its priority. First Availability stacked routes are executed on a control point basis. This is the default mode.

Sequence stacked routing executes a stacked route in a particular sequence that is predetermined by the authorized user. For instance the stack across control point A will not execute prior to control point B even if the route across A becomes available to prior to B if sequence stacked routing is specified.

TMDS allows the routes in a stack to be viewed and reordered by the authorized user. TMDS provides the ability to reorder a stack in any order.

Authority Issuance

Track and Time Authority:

Track and Time is a movement authority used in CTC territory that allows trains and/or maintenance of way operations between specified limits for a specified time period. A Track and Time authority can be issued to trains or maintenance of way.

Track Warrant Control:

Pass Stop Signal:

This authority type is used to instruct a train past a stop signal that authorizes the movement of a train from one main track to another main track or other-than-main track.

Enter Main Track Authority:

This authority type is used to instruct a train to enter onto track that is governed by CTC rules without the presence of a signal and typically through an electric-locked switch.

Restriction Issuance

Bulletins contain messages and restrictions for subsequent delivery to train crews and employees.

Track bulletins communicate speed restrictions, impose restricted operation due to maintenance activity, and notify train crews of special conditions.

Types:

Temporary Speed Restrictions

Maintenance Restriction

Miscellaneous information not addressed by other bulletins

Track Out of Service

Grade Crossing Protection

A tag is a label applied by an authorized user as a reminder. A tag may be restrictive or nonrestrictive in nature.

A nonrestrictive tag is for informational purposes only.

A restrictive tag may or may not be associated with an existing bulletin. If a restrictive tag is associated with a bulletin the tag is automatically created upon issuance of the bulletin. If a restrictive tag is not associated with a bulletin it will restrict the movement of the train

Train Sheet Summary

One of the primary functions of TMDS is to manage the information about each train controlled by the system.

There are several reasons that TMDS maintains information about the train. One of these reasons is to provide information to authorized users about the status of the train while the train is en route.

Another reason for maintaining this information is to provide information about the train after the train has reached its destination.

The purpose of the Train Sheet is to provide information about a train to the authorized user necessary for train operations. Information pertinent to each authorized user (based on train location, configurable parameter, etc.) is displayed.

Annotations	Train ID Tracking	Track Tags – Restrictive / Non-Restrictive
Playback/ Simulation	Train Sheet Management	Track Bulletin Management
Event Logging	Train Document Transmission – Print/Fax/Preview /Electronic	Functional Summaries – Authorities, Blocking, Bulletins, Train Sheet, etc.

