TDD Auto Train Configuration

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Contents

Chapter 1

Automatic Train Configuration

1.1 Version Log

Version	Date	Description	Signature
1.0	2017-06-09	First version	marlundg

1.2 Abbreviations

Abbreviation	Definition
TDD	Technical Design Description

1.3 Introduction

1.3.1 Design Overview

Investigate the design for Automatic Train Configuration

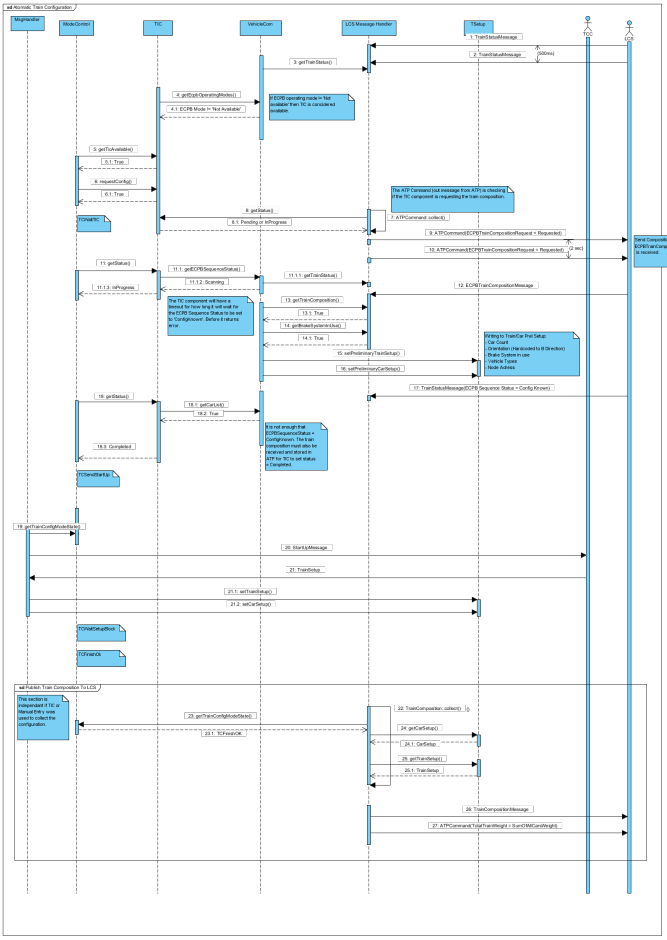
1.3.2 Requirements Traceability Matrix

Req	Short requirement description	Justification
AOS 1203	The AOS shall state in the StartUp message to TCC if the configuration was assembled automatically by a TIC system or manually by a driver.	Partially implemented
AOS 1744	The driver shall have the possibility to request the TIC system to deliver a new train configuration.	Partially implemented
AOS 34	The AOS shall send a StartUp-message to the TCC when a new train configuration, delivered by the TIC system or submitted by the driver, is accepted by AOS	Partially implemented

AOS 2299	The AOS shall based on information from TIC (if available) or from the driver collect the train configuration and send it in the StartUp message to TCC in the following block/fields:VEHICLE_ID_DATA, VEHICLE_LIST_DATA, B_DIRECTION (Locomotive orientation)	Partially implemented
AOS 32	After that the driver has selected mode Configuration the AOS shall initiate assembling of a new train configuration.	Implemented
AOS 1261	The AOS shall request the driver to assemble a new train configuration if a TIC system is NOT available on-board.	Partially implemented
AOS 1262	The AOS shall request the TIC system to assemble and deliver a train configuration if this system is installed and available on-board.	Not implemented
AOS 1742	The maximum execution time for the TIC system to deliver a train configuration shall be configurable through a parameter.	Not implemented
AOS 1193	If a new train configuration is not delivered by the TIC system on time the AOS shall regard the TIC system as NOT available on-board.	Not implemented

1.4 System Architectural Design.

The interaction between the different components to full-fill the above mentioned requirements:



1.4.1 Chosen System Architecture

1.4.2 Discussion of Alternative Designs

1.4.3 External Interface Description

1.5 Detailed Description of Components

1.5.1 Vehicle Com

1.5.1.1 General

The VehicleCom component shall keep latest status-values received from the LCS until next status message is received from LCS. If the connection towards LCS is disconnected (the VehicleCom will notice it by a timeout when receiving the LCS Status message), the access methods towards VehicleCom will return false (value not valid).

1.5.1.2 AOS1203

When writing to Preliminary TrainSetup from Vehicle COM, set the ticAvailable parameter to true and the brake↩ System to received Brake system in use (getBrakeSystemInUse()). If writing to Preliminary TrainSetup from DMI, set the ticAvailable parameter to false.

1.5.2 Mode Control

1.5.3 AOS1744

If an error occurs (e g time-out) when calling TIC::getStatus() from Modecontrol (in state TCWaitTIC), the Config Sub mode is set to TCWaitNewConfigDMI, and the driver can either enter config manually or send a request to try TIC again. In method runTrainConfigWaitNewConfigDMI(), check if 'TIC-Request button' was entered by calling DMI getDMIButtonStatus() (TBD which bit to check). If TIC is requested -> call TIC::requestConfig() and go to sub-state TCWaitTIC.

1.5.3.1 AOS34, AOS2299

Mode Control will be in either TCWaitNewConfigDMI or TCWaitTIC, depending if TIC is available or not. The DMI or VCOM will put received configuration in preliminaryTSetup. TCWaitNewConfigDMI mode is already implemented. TCWaitTIC shall call getPreliminaryTrainSetup() to see if any data is pushed, and continue to TCSendStartUp.

1.5.3.2 AOS32

This requirement is already full-filled and independent if TIC is used or not. (Transition from PowerUp- to Configuration mode).

1.5.4 Message Handler

1.5.4.1 AOS34, AOS2299

B-Direction will be hard-coded for TIC to B-end facing cars.

1.5.4.2 AOS1261, AOS1262

In ModeControl state TCWaitQSetup a check shall be done if TIC is available (TIC::getTicAvailable(), if TIC is not available the next state is TCWaitNewConfigDMI. If TIC is available a call to TIC::requestConfig() shall be made and proceed to sub-state TCWaitTIC.

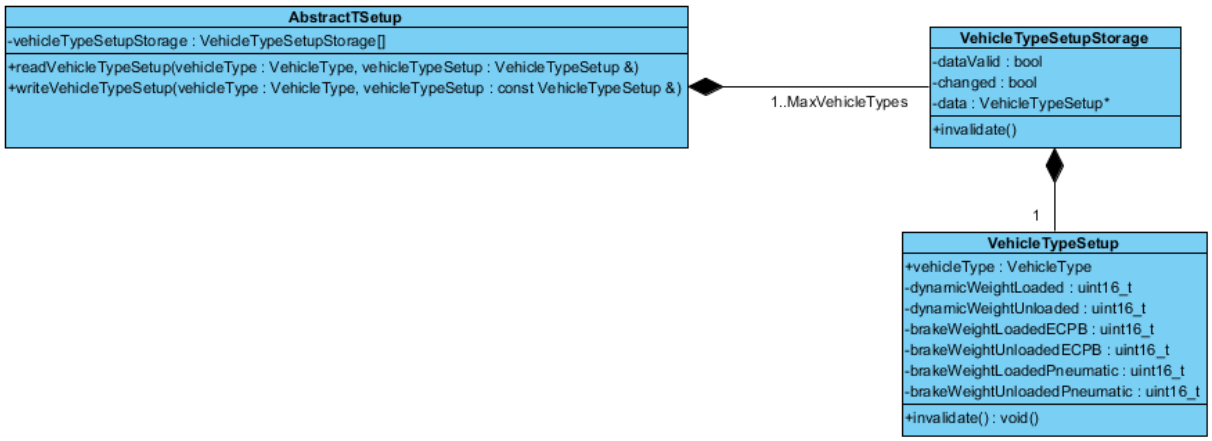
1.5.4.3 AOS1742, AOS1193

The timeout is implemented in the TIC component. When waiting in sub-state TCWaitTIC and the TIC::getStatus() is returning 'error' (as a cause for the timeout), the next state will be TCWaitNewConfigDMI, to be able to enter the configuration manually. TBD: It shall be possible to retry with a button in DMI according to AOS1744(for instance if the TIC is repaired)?

1.5.5 Train Setup

1.5.5.1 VehicleTypeSetup

- Add a new attribute in class TrainSetup to store loaded/unloaded status.
- Add new attributes in class TrainSetup to store total train weight (dynamic/ECPB/Pneumatic and loaded/unloaded for all types i e Totally 6 different values)
- Add new storage for VehicleTypeSetup (similar to CarSetupStorage/CarSetup)



The received Vehicle Types in TrainSetup shall be stored in the new storage for VehicleTypeSetup, the loaded/unloaded flag in TrainSetup is set to 'loaded'. When an MA arrives the loaded/unloaded flag is also updated according to MA.

When Vehicle Types are stored, and when an MA arrives, a new weight shall be calculated for the train. This weight will be the sum of all cars (according to the vehicle types and status of unloaded/loaded flag).All different types are calculated (Dynamic/ECPC and Pneumatic).

1.5.6 Screen Images

1.5.7 Objects and Actions

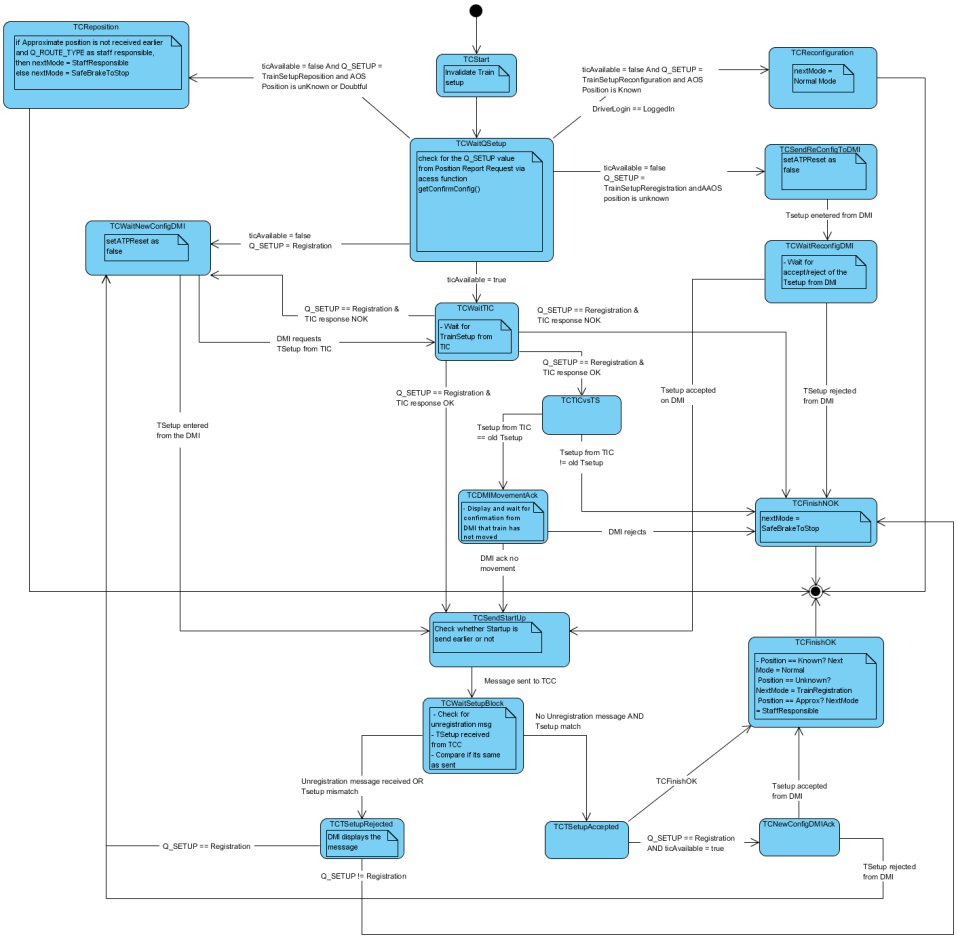
1.6 Task Distribution

The following tasks needs to be synchronized:

- #4777 AOSPC, Automatic train configuration: Implementation - Simulation
- #4736 Preliminary SCDS for TIC Component -SCDS
- #4736 TIC - Implementation - ATP BHP
- #4776 Automatic train configuration: Implementation - ATP BHP
- #???? VehicleTypeSetup in DataStorage

1.7 Additional Material

For easier reference, the state-chart for the Configuration Mode is included:


TCReposition
If Approximate position is not received earlier and Q_ROUTE_TYPE as staff responsible, then nextMode = StaffResponsible else nextMode = SafeBrakeToStop
ticAvailable = false And Q_SETUP = TrainSetupReposition and AOS Position is unKnown or Doubtful
TCStart
Invalidate Train setup
ticAvailable = false And Q_SETUP = TrainSetupReconfiguration and AOS Position is Known
DriverLogin == LoggedIn
TCReconfiguration
nextMode = Normal Mode
TCWaitQSetup
check for the Q_SETUP value from Position Report Request via acess function getConfirmConfig()
ticAvailable = false Q_SETUP = TrainSetupReregistration andAAOS position is unknown
TCSendReConfigToDMI
setATPReset as false
Tsetup enetered from DMI
TCWaitReconfigDMI
- Wait for accept/reject of the Tsetup from DMI
TCWaitNewConfigDMI
setATPReset as false
ticAvailable = false Q_SETUP = Registration
ticAvailable = true
Q_SETUP == Registration & TIC response NOK
DMI requests TSetup from TIC
TCWaitTIC
- Wait for TrainSetup from TIC
Q_SETUP == Reregistration & TIC response NOK
Q_SETUP == Reregistration & TIC response OK
Q_SETUP == Registration & TIC response OK
TCTICvsTS
Tsetup accepted on DMI
TSetup rejected from DMI
TSetup entered from the DMI
Tsetup from TIC == old Tsetup
Tsetup from TIC != old Tsetup
TCDMIMovementAck
- Display and wait for confirmation from DMI that train has not moved
DMI rejects
TCFinishNOK
nextMode = SafeBrakeToStop
DMI ack no movement
TCSendStartUp
Check whether Startup is send earlier or not
TCFinishOK
- Position == Known? Next Mode = Normal
Position == Unknown? NextMode = TrainRegistration
Position == Approx? NextMode = StaffResponsible
Message sent to TCC
TCWaitSetupBlock
- Check for unregistration msg
- TSetup received from TCC
- Compare if its same as sent
No Unregistration message AND Tsetup match
Unregistration message received OR Tsetup mismatch
TCFinishOK
Tsetup accepted from DMI
TCTSetupRejected
DMI displays the message
TCTSetupAccepted
Q_SETUP == Registration AND ticAvailable = true
TCNewConfigDMIAck
Q_SETUP == Registration
Q_SETUP != Registration
TSetup rejected from DMI