

## Description of K42911 train movement:

Via LIG, Wabtec confirmed that there was a successful Trip Optimizer trip initialization and trip end/summary on CSXT 168 on the morning of 2/13/2020.

The Locomotive Interface Gateway (LIG) is an application that runs in the CMU onboard the locomotive. It collects data from the control system and broadcasts it to the onboard PTC network using an AAR standard format. CSX collects that data and sends it off-board for analysis. A visualization of the data is available in Tableau in near real time and is stored for seven days.

Wabtec communicated, 10.09 total trip miles, 6.5 miles in auto control.

**Note: Times in GMT, so you must subtract 5 hours**

CSX 168

CTRL CFG.ACCAX    Days 2    Date Range 02/11/2020 22:51:00    02/13/2020 22:51:00    Show Auto HC    Show TO

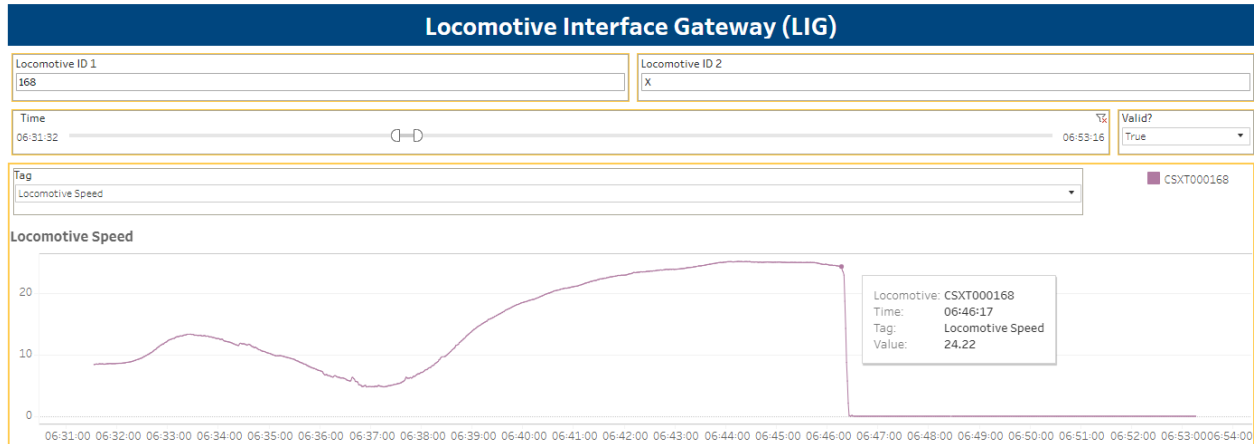
| FixedParameters  |                  |            | standard | basic                                |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    |            |             |
|------------------|------------------|------------|----------|--------------------------------------|------------|--------|-----------|-------|-----------|----------|------------|----------|------|--------|------|---|---|---|---|---|---|---|---|----|------------|-------------|
| Occur Date       | Reset Date       | Fault Code | SUBID    | Fault Description                    | Loco Speed | Direct | Eng Speed | Volts | Alt Field | Alt Amps | Water Temp | Oil Temp | Claw | Blower | Info | A | B | L | M | O | S | V | W | HP | V Latitude | V Longitude |
| 02/13/2020 11:45 | 02/13/2020 11:49 | 46-4506    | 00       | Trip Optimizer Throttle C Trainline  |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:20:5.2  | -82:23.3    |
| 02/13/2020 11:47 | 02/13/2020 11:47 | 46-4553    | 00       | Trip Optimizer iLC GenField Mismatch |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:20:5.3  | -82:23.3    |
| 02/13/2020 11:46 | 02/13/2020 11:46 | 12-0066    | 00       | Trip Ended Automatically             |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:20:5.2  | -82:23.3    |
| 02/13/2020 11:46 | 02/13/2020 11:46 | 46-4553    | 00       | Trip Optimizer iLC GenField Mismatch |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:20:5.2  | -82:23.3    |
| 02/13/2020 11:46 | 02/13/2020 11:46 | 46-4526    | 00       | Trainline 6 and Trainline 21 High a  |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:20:5.2  | -82:23.3    |
| 02/13/2020 11:46 | 02/13/2020 11:46 | 46-4525    | 00       | Trainline 6 and Trainline 17 High a  |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:20:5.2  | -82:23.3    |
| 02/13/2020 11:46 | 02/13/2020 11:46 | 46-4558    | 00       | Trail Trainline 6 and Trainline 21   |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:20:5.2  | -82:23.3    |
| 02/13/2020 11:46 | 02/13/2020 11:46 | 46-4557    | 00       | Trail Trainline 6 and Trainline 17   |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:20:5.2  | -82:23.3    |
| 02/13/2020 11:46 | 02/13/2020 11:46 | 08-0211    | 00       | Trainline 6 and 21 High at the Same  |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:20:5.2  | -82:23.3    |
| 02/13/2020 11:46 | 02/13/2020 11:46 | 08-0210    | 00       | Trainline 6 and 17 High at the Same  |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:20:5.2  | -82:23.3    |
| 02/13/2020 11:41 | 02/13/2020 11:46 | 12-0524    | 00       | Consist Control: CH1 Trail Local Ho  |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:21:12.1 | -82:24      |
| 02/13/2020 11:13 | 02/13/2020 11:17 | 12-0528    | 00       | Consist Control: Lead Trainline Ho   |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:25:4.8  | -82:27.4    |
| 02/13/2020 11:10 | 02/13/2020 11:21 | 12-0524    | 00       | Consist Control: CH1 Trail Local Ho  |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:25:24.4 | -82:26.2    |
| 02/13/2020 11:05 | 02/13/2020 11:05 | 12-0154    | 00       | Trip Optimizer Estimate Replan       |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:25:30.7 | -82:26.4    |
| 02/13/2020 11:04 | 02/13/2020 11:04 | 12-0044    | 00       | Track Input Not Provided by Operator |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:25:30.6 | -82:26.4    |
| 02/13/2020 11:04 | 02/13/2020 11:04 | 12-0064    | 00       | Operator Accepted Trip Data          |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:25:30.6 | -82:26.4    |
| 02/13/2020 11:04 | 02/13/2020 11:04 | 12-0084    | 00       | Train Data Changed - Trip Init       |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:25:30.6 | -82:26.4    |
| 02/13/2020 11:01 | 02/13/2020 11:01 | 12-0086    | 00       | Operator Attempted New Trip On SDIS  |            |        |           |       |           |          |            |          |      |        |      |   |   |   |   |   |   |   |   |    | 37:25:30.7 | -82:26.4    |

Based on that data:

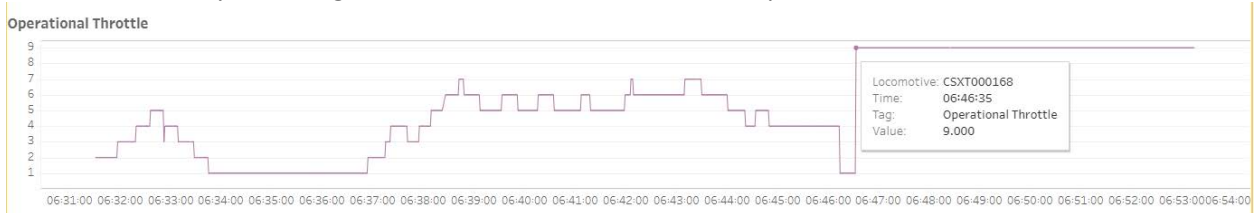
- At 06:04: The locomotive operator accepted the trip data. This would have been where the crew boarded the train and the train departed from (Shelbiana, KY) milepost CMG 114.
- At 06:46 the trip ended. This would have been at the derailment site, near the CMG 123.8

LIG data continued to transmit until 06:53:15 (nearly 7 minutes after the derailment occurred), although throttle data became invalid/shutdown at 06:46:35. It is believed that the Emergency Fuel Cut Off (EFCO) was activated.

The data shows that the train speed just prior to the derailment was at or near 24 mph. The train throttle was in position 5.



Note: Immediately following the accident, LIG shows throttle in position 9, which indicates shutdown.



|        |  |  |
|--------|--|--|
| 0x1027 | Throttle Notch, Requested Throttle Notch | 1, unsigned,<br>0 = Idle, Brake Set-Up, or Brake,<br>1 = Notch 1,<br>2 = Notch 2,<br>3 = Notch 3,<br>4 = Notch 4,<br>5 = Notch 5,<br>6 = Notch 6,<br>7 = Notch 7,<br>8 = Notch 8,<br>9 = Shutdown / Invalid, N/A |
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**Summary:**

Based on LIG data, it is believed that the locomotive operator initialized Trip Optimizer (an energy management system known as TO) prior to departing Shelbiana KY. The data shows that the trip only lasted 10 miles and that 6.5 of those miles were operated in auto control (similar to cruise control). Just prior to the accident, the train was operating in auto control via TO just below the authorized speed of 25 mph. Approximately 7 minutes following the end of any recorded movement, LIG shows the trip ended and it appears that power/fuel was disabled.