![Kidde]

KI-HDT Map Fault Diagnostics Application Guide

Content

Contact information

For contact information, see www.kidde-esfire.com.

Introduction

This document provides examples of typical mapping issues and how to use the KI-HDT to diagnose and fix these mapping issues. For a review of the mapping process, please refer to *KI-HDT User Guide* (P/N 3102576).

Diagnosing mapping issues using the KI-HDT

Mapping issues can occur when the Signature SLC controller receives inconsistent mapping data or data that does not match the actual signaling line circuit topology. As a result, the SLC controller may not be able to complete the mapping process, and you may see map fault errors on the control unit.

Note: Detector generations after GSA/FX feature double mapping current to provide more robust mapping consistency.

Some typical causes of map fault errors:

- Corrosion on the detector base's spring clips, the detector head's contacts, or on the wire ends or screw terminals
- Dust or contaminants between the spring clips and contact
- Bent spring clips on the detector base
- Screw terminals that are loose or too tight
- The detector base is warped

Typically, map fault errors are resolved by re-stripping the wires, tightening loose connections, adjusting the spring clips, and verifying SLC IN and SLC OUT connections are correct. In some cases the detector base must be replaced to resolve the issue.

The KI-HDT software can be used to diagnose mapping related issues and pinpoint the locations where faults are likely to be present. Figure 1 below shows the KI-HDT software.

Figure 1: KI-HDT software
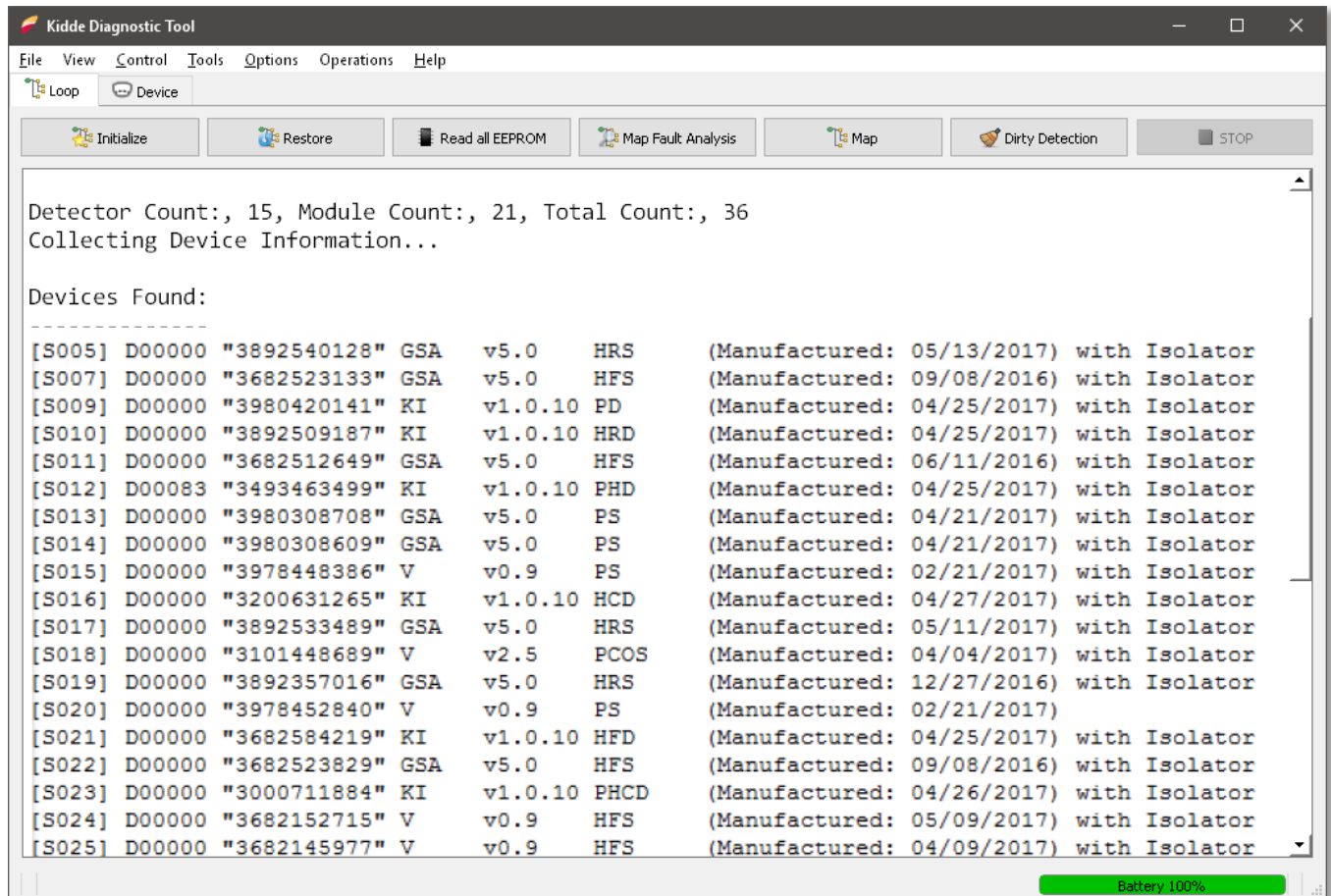
To diagnose mapping issues, we will use the Map Fault Analysis function, which consists of the following operations:

Mapping Consistency: Sends the Mapping command multiple times to each device, and checks that the response is the same each time. A list of devices is shown for devices that do not provide a consistent response. The number of mapping attempts is set from the menu (Options > Set Mapping Attempts).

Map Structure Validation: The mapping data obtained by the Mapping Consistency function is analyzed to determine whether to generate a valid map. If the map is not valid, then devices from the Map Fault Consistency, Contact Analysis, or the Possible False EOLs need to be examined.

Contact Analysis: Checks the quality of the sensed signal on each device. If the sensed signal is too low on a specific device, this device should be checked for poor contacts. The contact threshold can be changed on the menu (Options > Set Contact Threshold).

Possible False EOLs: Shows a list of possible False EOLs (end-of-lines). Devices that are incapable of sensing mapping current are shown on the Possible False EOL list. A possible false EOL is an EOL that shares a parent with other devices. False EOLs may or may not be actual errors (the signaling line circuit could have been intentionally wired this way). It is recommended to check with the master site plan drawing or check the actual device and verify if it is actually an EOL. More information about Possible False EOLs is shown in "Map Fault Scenario 1: False End of Line" on page 4.

Map Tree: The topology of the signaling line circuit is shown. It is recommended to compare it against the master site plan drawing if it is available.

Procedure for diagnosing an entire signaling line circuit (SLC)

1. Disconnect the SLC from the control unit. Connect the SLC to the KI-HDT, and then connect the KI-HDT to a PC running the KI-HDT software.

2. Start the KI-HDT software, and then verify the connection to the KI-HDT.

3. Press Initialize. This step allows the KI-HDT to identify all the devices on the SLC. This process can take several minutes depending on the size of the SLC.

4. Press Map Fault Analysis. This process can take several minutes depending on the size of the SLC.

5. Fix all the devices that have failed Mapping Consistency or Contact Analysis.

6. Verify that all Possible EOLs are actually EOLs.

7. Repeat procedure from step 4 until no Mapping Consistency or Contact Analysis errors are found and that all Possible EOLs are actually EOLs.

Procedure for diagnosing single or multiple devices

The Device tab contains a new set of functions for diagnosing devices individually or multiple devices at a time. Figure 2 on page 4 shows the Device tab and its different components. The signaling line circuit needs to be initialized before using the functions on the Device tab. To select one device, click the corresponding row on the Devices list. To select multiple devices, press the CTRL key and then click the corresponding rows on the Devices list before releasing the CTRL key.

Figure 2: KI-HDT Software > Device Tab

Function Buttons

Device List

Output Window
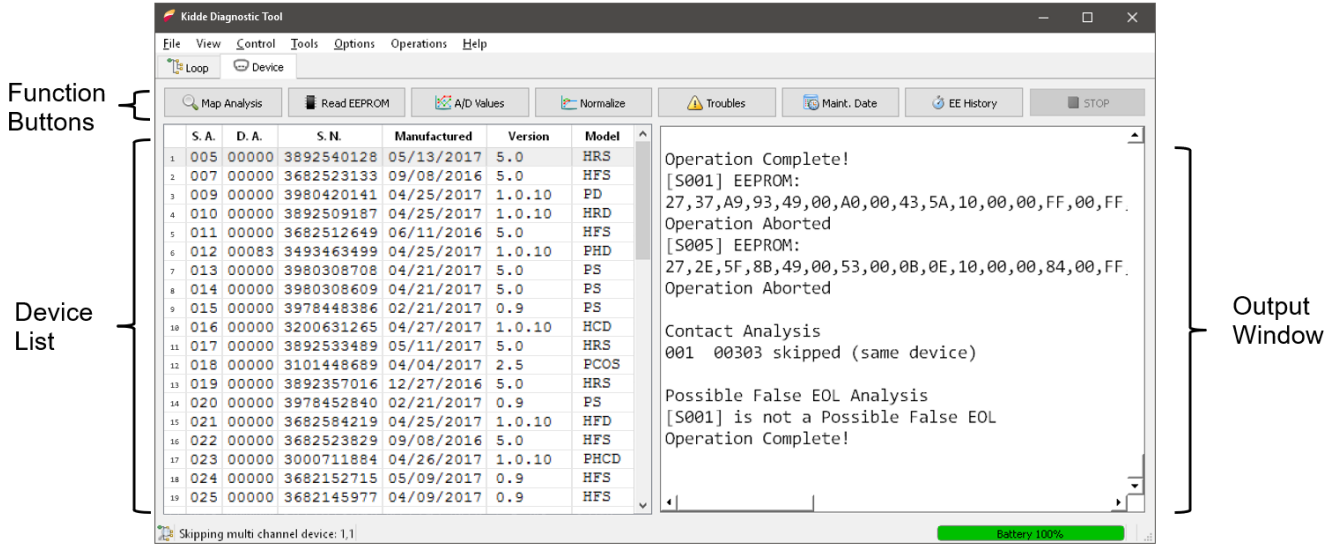
Map Analysis function

Usw the Map Analysis function to quickly diagnose one or a few devices that previously failed during the Map Fault Analysis on the Loop tab. The Map Analysis function only performs a Contact Analysis measurement, and a Possible False EOL analysis. This saves time compared to running the full Map Fault Analysis again.

Note: Before you can use the Map Analysis function, you must run the Map Fault Analysis from the Loop tab, or create a map.

**To perform a map analysis on selected devices:**

1. Select one or more devices, and then click Map Analysis.

2. Verify the expected output.

Map Fault Scenario 1: False End of Line

Consider a simple network of four devices as shown on Figure 3 below. In this scenario, the base for device #2 has increased resistance, causing device #2 to not properly sense the mapping current from the other devices.

Figure 4 on page 5 shows the mapping process. Table 1 on page 5 shows the resulting map data.

Figure 3: Base for device #2 has increased resistance
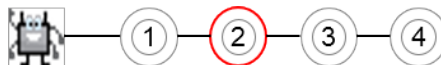
Figure 4: Map Fault Scenario 1 mapping process

Map device #1

Map device #2

Map device #3

Map device #4

🔵 Current Activated   ⚪ Current Sensed
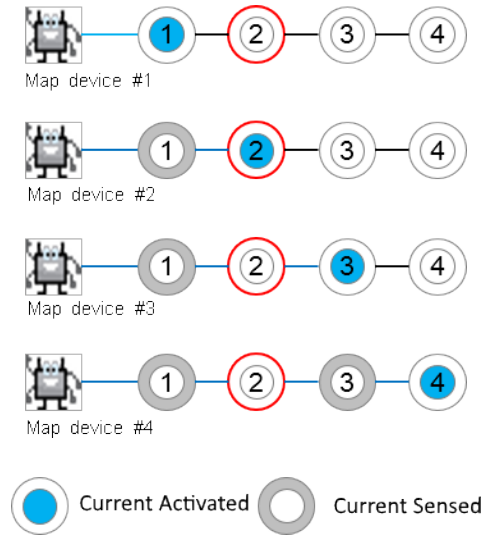
Table 1: Map Fault Scenario 1 map data

		Current Detected			
		1	2	3	4
Current Activated	1	A			
	2	S	A		
	3	S		A	
	4	S		S	A

S: Current Sensed
A: Current Activated

With the information from Table 1 above, the SLC controller generates a map topology that does not match the actual wiring. Device #2 is shown as an End of Line (EOL), as shown on Figure 5 below. This is also known as a false t-tap. If the technician accepts this new map on the control unit, the control unit will not show any errors.

Figure 5: Device #2 shown as an EOL
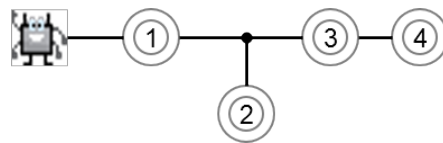
Example output from the Map Fault Analysis:

```
Possible False EOLs
---------------------
[S002] D00042 "3200631265" KI PD    v1.0.10    (Manufactured: 06/22/2019)
```

Map Fault Scenario 2: Missing devices

Consider a simple network of four devices as shown on Figure 6 below. In this scenario, the base for device #2 has some increased resistance, device #3 is a KI device, and all other devices are FX devices. The resistance is such that it can detect double mapping current, but not normal mapping current.

Figure 7 below shows the mapping process. Table 2 below shows the resulting map data.

Figure 6: Base for device #2 has increased resistance, device #3 is a KI device

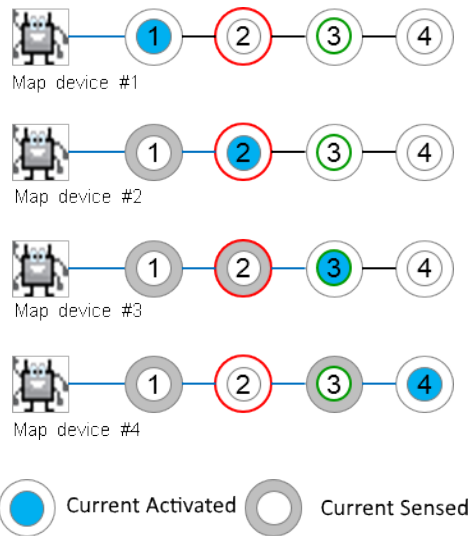**Figure 7: Map Fault Scenario 2 mapping Process**


Table 2: Map Fault Scenario 2 map data

		Current Detected			
		1	2	3	4
Current Activated	1	A			
	2	S	A		
	3	S	S	A	
	4	S		S	A

S: Current Sensed
A: Current Activated

With the information from Table 2 above, the SLC controller cannot complete the mapping process. The data from the table does not generate a valid map topology, since device #4 is sensed by device #1 and device #3, but not by device #2. Figure 8 below shows the partial map topology from Table 2 above.

Figure 8: Device #2 is shown as an EOL
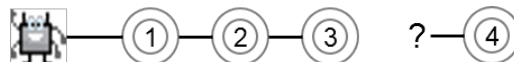
Example output from the Map Fault Analysis:

```
Map Structure Validation:
-------------------------
Invalid Map, investigate devices with low DIFF in the Contact Analysis.


Contact Analysis Report - Investigate for poor connections on these devices
-----------------------
Device [S002] D00042 "3930391156" did not respond during contact analysis.


Possible False EOLs
---------------------
Skipped since there are errors on the loop.
```

Map Fault Scenario 3: Multiple parents

Consider a simple network of four devices as shown on Figure 9 below. In this scenario, the base for device #2 has some increased resistance, device #4 is a KI device, and all other devices are FX devices. The resistance is such that it can detect double mapping current, but not normal mapping current.

Figure 10 below shows the mapping process. Table 3 on page 8 shows the resulting map data.

Figure 9: Base for device #2 has increased resistance, device #4 is a KI device
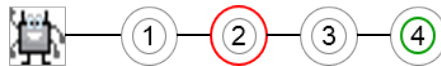
**Figure 10: Map Fault Scenario 3 mapping process**
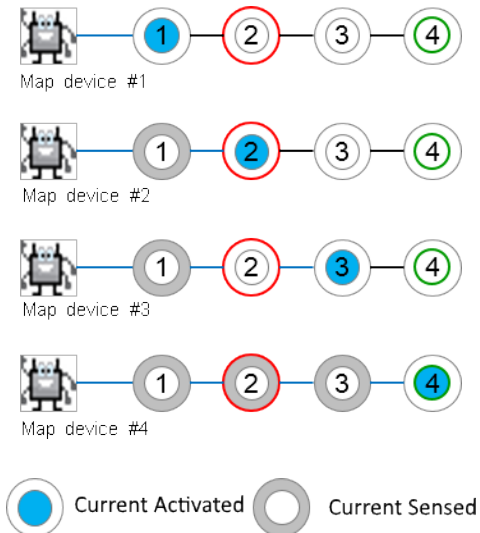
Table 3: Map Fault Scenario 3 map data

		Current Detected			
		1	2	3	4
Current Activated	1	A			
	2	S	A		
	3	S		A	
	4	S	S	S	A

S: Current Sensed
A: Current Activated

With the information from Table 3 above, the SLC controller cannot complete the mapping process. The data from the table does not generate a valid map topology, since device #3 is only sensed by device #1, while device #4 is sensed by device #1, device #2 and device #3. Figure 11 below shows how the data from Table 3 above is interpreted.

Figure 11: Device #4 has multiple parents
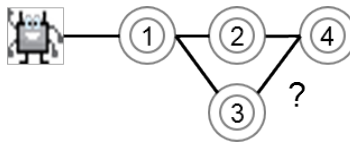
Example output from Map Fault Analysis:

```
Map Structure Validation:
------------------------
Invalid Map, investigate devices with low DIFF in the Contact Analysis.


Contact Analysis Report - Investigate for poor connections on these devices
----------------------
[S002] D00042 "3930391156" FX 270  v5.0 (Manufactured: 06/22/2018), mapping measurement: -3


Possible False EOLs
--------------------
Skipped since there are errors on the loop.
```