HOW TO USE OPTICAL FIBER WITH VESDANET APPLICATION NOTE

May 2023
Doc. No. 10846_06

Preface

This Application Note outlines how to use optical fiber to transmit VESDAnet.

Related Products

Optical fiber can be used with VESDA and VEDSA-E detectors.

Contents

1 What is VESDAnet?

Using independent RS485 links between VESDA detectors, VESDAnet forms a bi-directional fault tolerant communication loop. This means that if there is a communication fault in one link of the loop then it is clearly identified which link is failing and all messages are reflected by the devices either side of the failed link. This ensures that all detectors remain in communication with each other even when there is a failed link. VESDAnet is supported by the following VESDA devices:

- VESDA VLP
- VESDA VLC (VLC-505)
- VESDA VLI (VLI-885)
- VESDA VLF with VN card
- VESDA-E VEU
- VESDA-E VEP
- Remote displays, programmers and interfaces

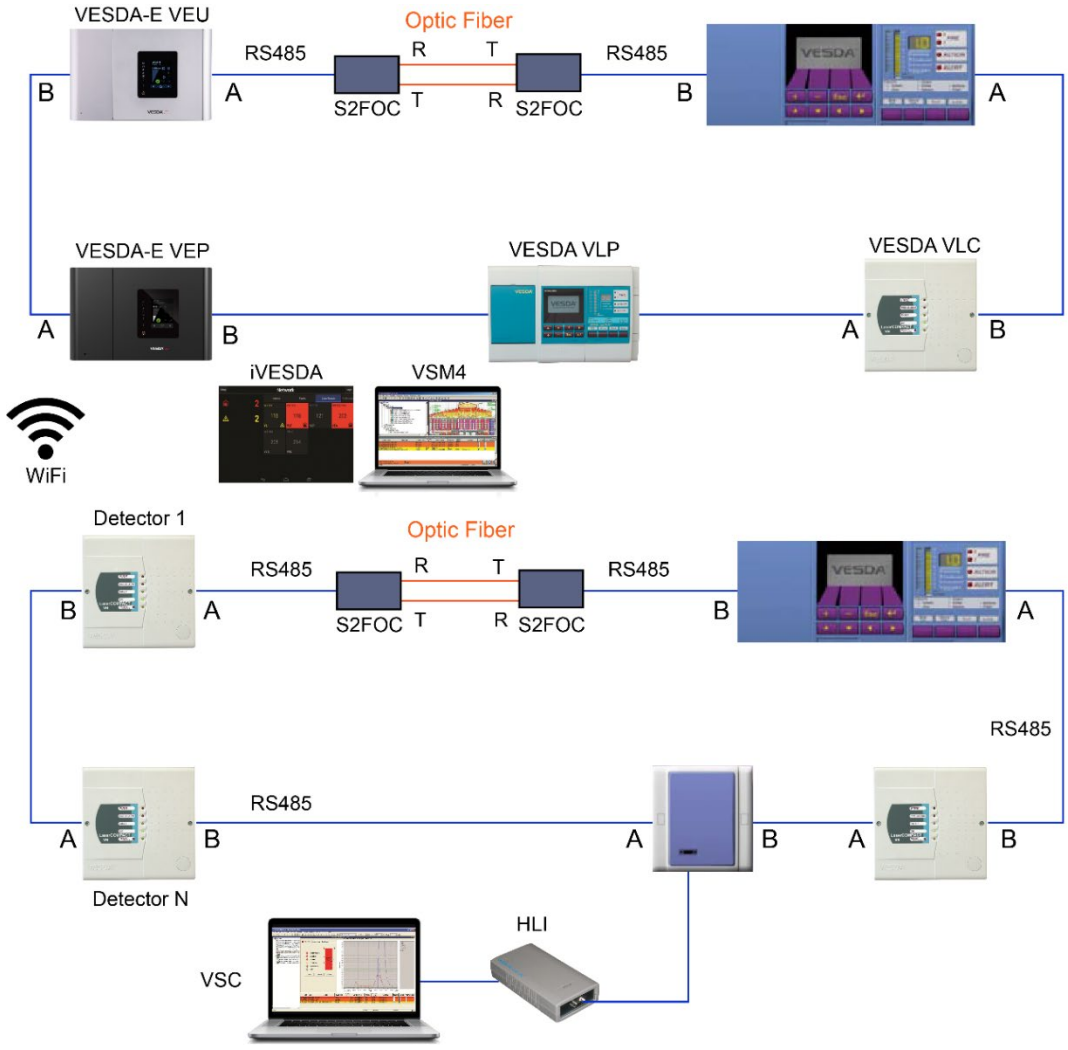

Figure 1: Closed loop VESDAnet - two (or more) optical fiber links

Note!

Optic Fiber and converter in a VESDAnet loop is not approved for primary reporting.

2 Key Considerations

The design guidelines in this document are applicable to warehouses possessing any of the following building attributes:

Consider these points when designing an optical fiber link for VESDAnet transmission:

- Limit the total number VESDA detectors to twenty (20) when using an open-ended VESDAnet. This ensures that the volume of traffic over VESDAnet remains light even in full alarm conditions.
- Use up to 40 detectors on a closed loop system but follow the recommendations for the setting of the “minimum interval” as defined in the VESDA System Design Manual.
- Ensure that the optical fiber link will not fail if the power fails, particularly for installations where VESDAnet is the only communication media for the reporting of primary alarm information.

Use a closed loop, fault tolerant, VESDAnet network when possible, particularly for installations where it is the only communication media for the reporting of primary alarm information.

3 Example Installation

This example installation, using a multi-mode fiber optic connection (Telebyte Model 276A Optoverter™), an open-ended VESDAnet configuration and one optical fiber link was subjected to limited testing by Xtralis. Tests conducted were non-exhaustive and were in the environment described below.

Note: Xtralis do not recommend any particular S2FOC device (refer to the Further details section at the end of this Application note). The configurations, set-up procedures and other technical details described herewith are based on the functions and features of the Telebyte Model 276A Optoverter™, as was used during testing. Xtralis do not supply an optical fiber solution for VESDAnet and there is not guarantee that the information provided herein, nor the devices referred to will provide a totally robust solution.

4 Equipment Used

- RS485 to Fiber Optic Converter, 2 wire (Telebyte Model 276A Optoverter™)
- Duplex Fiber Optic Patch Cables with ST connectors on one end, and ST or SC connectors on the other end depending on the Patch Panel
- A DB-25 male connector per S2FOC
- Minimum of two VESDAnet detectors
- VESDA HLI, model VHX-0200 (if monitoring with VSM is required and not with iVESDA)

5 Equipment Description

1. The Telebyte Model 276A Optoverter™ is a two-wire RS485 to Fiber Optic Line Driver/Converter that can extend the distance of an RS485 network to 2000 m (6600 ft), according to the manufacturer's specifications.
2. The RS485 connector on the Telebyte Model 276A Optoverter™ allows for half-duplex operation through a DB-25 female connector. A custom-made cable connecting a DB-25 male connector to the detector's RS485 terminal is needed. Pin assignments are shown in Table 1.

Table 1: Telebyte Model 276A Pin assignments

DB-25F (Telebyte)	Signal	DB-25M (Custom-made)
2	Data I/O-	2
14	Data I/O+	14
7*	Signal Ground/GND	7
9*	+Vcc	9

* Usually, the Telebyte Model 276A is powered with a small power adaptor (AC to +12 VDC). Alternatively, a +12 VDC can be applied directly across Pin 7 and 9. 3.

3. The Fiber Optic end has been optimized for operation with 62.5/125 µm cable (i.e. multi-mode) and is equipped with ST-type fiber optic connector.

6 Set up Procedure

1. Plug the custom-made cable (described in Equipment description above), with the DB-25 male connector attached, into the Telebyte 276A's DB-25 female connector. Referring to Table 1, connect Data I/O- and Data I/O+ from the Telebyte 276A to the two-wire data from the detector's RS485 terminal (i.e. A- and A+ or B- and B+ respectively).
2. Connect the Telebyte 276A to another Telebyte 276A, by connecting the fiber connector marked "T" to the far-end fiber connector marked "R" and the local "R" to the far-end "T". Note: If the Patch Panel is equipped with SC-type connectors, SC/ST Duplex Fiber Optic Patch Cables must be used to interface with the Telebyte 276A.
3. Power on the Telebyte 276A when connection is complete.

7 Background Information

7.1 Optical Fiber Technology

An Optical fiber is made up of two key parts, the core, and the cladding. They are available in many different forms and sizes with various connection systems. To transmit VESDAnet they require a serial to fiber optic converter (S2FOC) at each end, which must be carefully selected and tested to provide a transparent RS485 communication link.

7.2 Multi Mode and Single Mode Fiber

The difference between multi-mode and single-mode fibers is that in multi-mode fibers the light rays may take any number of different routes to reach the far end of the fiber, causing a spreading of the light pulse, also known as Intermodal Dispersion. There is no modal dispersion in single-mode fibers as there is only one route through the fiber. Therefore, single-mode fibers are considered to be of higher quality and are generally more expensive. Furthermore, the launch device in single mode is generally a laser whereas multimode TX/RX devices can use LED technology and are generally cheaper. However, transmission distances over single mode are much greater (e.g. 20 km compared with 2 km).

7.3 Connectors

There are many different connection systems for optical fibers with the most common being ST and SC. ST connectors use push-locking system and are considered to be ideal for offices, whereas the SC connectors use a bayonet locking system and are best for industrial applications. Both ST and SC systems use separate connections and fibers for transmit and receive. Other systems such as the MT-RJ connectors connect RX and TX fibers in one connection and are common in office Ethernet environments.

7.4 Optical Drivers

There are many serial-to-fiber optic converters (S2FOC) on the market, some of which transmit VESDAnet successfully and others do not. Generally, a S2FOC device will convert the RS485 signal to a proprietary protocol for transmission through fiber and the S2FOC device at the far end will convert it back. It is essential that this conversion it truly transparent and does not interfere with the VESDAnet messages.

7.5 Selecting S2FOC Devices

Consider the following information when selecting appropriate S2FOC devices:

- VESDAnet uses standard RS485 comms.
- VESDAnet operates at 19200 baud, 8 data bits, one start bit, odd parity, one stop bit making a frame of 11 bits.
- When there is no traffic on the VESDAnet, adjacent devices communicate back and forth alternately at regular intervals. These regular single byte messages must not be interfered with in anyway by the intelligence in the S2FOC.

8 Further Support

Your S2FOC supplier should provide detailed information and technical support on interfacing to the chosen device. You can also refer to specific manufacturer’s manuals and troubleshooting guides.

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Doc. No. 10846_06
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