Openpath Smart Reader
(OP-RLF-STD & OP-RLF-MUL)

Description of Operation

The Openpath LF Reader provides access to entries in user offices by any of three methods: Bluetooth Low Energy (BLE) communication with the user's phone, 125kHz RFID cards or fobs, and capacitive touch switch. The reader communicates with a separate Access Control Unit (ACU) over twisted pair cabling using RS-485 protocols. Power (12V DC) is supplied through a second pair of wires in the same cable. Additional connections are available to allow signals from the user's legacy keypad or reader to be sent back to the ACU over the same cable.

The reader contains two circuit boards. The Main board holds the BLE modules, voltage regulators and capacitive touch circuit, and the LED board holds the RFID card reader circuitry and the display LEDs with their controller.

The BLE data link to a phone is handled by a Rigado BMD-340, a certified module based on the nRF 52840 BLE SoC. The reader uses BLE to connect with the Openpath app in the user's phone in order to validate the user and allow the user to enter via mutual authentication. In addition to providing BLE communication, the processor within the module is used to control all functions within the Reader and send and receive data with the ACU.

An additional BLE module, the Taiyo Yuden EYSGJNZWY based on the nRF 51822 BLE SoC, acts as a BLE beacon to wake up the user's phone as they approach in order to minimize the delay needed for validation before a user can enter. The controller in the module also decodes the raw data from the RFID reader chip and passes the filtered data to the controller in the main BLE module so it can be sent to the ACU.

The reader is powered with +12V, which is converted to +5V by a switching regulator, and then to +3.3V by three linear regulators. The 5V supply is used for level shifters, LEDs, and the RFID reader IC. The primary 3.3V regulator powers the BLE modules. The second 3.3V regulator supplies the RS-485 interface and level shifters for legacy devices. The third 3.3V regulator is for the LED controller.

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The RFID chip uses an internal PLL to drive a series resonant coil and capacitor at 125kHz. The field from the coil will activate a low frequency RFID card placed close to the reader. The return signal from the card is picked up by the same coil and passed back to the receiver input of the RFID chip which demodulates the card signal and sends raw data to the controller in the beacon BLE module for processing.

Capacitive touch uses a dedicated integrated circuit to sense the small change in capacitance when a user touches the reader. A flexible conductive electrode is attached to the inside face of

the reader housing to extend the sensing area. The touch signal is sent to the main BLE module for processing, and then to the ACU to determine whether the user should be allowed access.

The LED display consists of a ring of white LEDs with a white and RGB led in the center. These LEDs use different colors or patterns to inform the user of status, such as when an entrance is open or when a user is accepted or rejected.

Legacy keypads and readers can be connected to the Reader, which will pass the signals to the ACU. The Reader provides +12V for an external device and incorporates input protection and level shifting for signals coming from the device.