

VTAP

Application Note - Using barcode or QR scanners with VTAP readers

VTAP Core Firmware from v2.2.7.0

VTAP Connectivity Firmware from v1.0.4.3

VTAP50 and VTAP100

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If you need help to set up or use your VTAP reader, beyond what is contained in this Application Note, then please contact our support team.

Email: vtap-support@dotorigin.com

Download the latest documentation and firmware from <https://vtapnfc.com>

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If you have any feedback on setting up or using your VTAP reader or this documentation, then please contact our support team. The product is constantly being reviewed and improved and we value feedback about your experience.

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1 Barcode or QR scanners with VTAP readers

VTAP readers are designed to read NFC mobile wallet passes, cards and tags. When you begin a transition from using legacy barcode or QR scanners to modern NFC mobile wallet, you may need to support a mixed population of VTAP readers and barcode or QR scanners for some time.

To ease this situation, a VTAP reader can connect to a barcode or QR scanner, either over one of its serial interfaces or wirelessly over Bluetooth. The VTAP reader can receive a payload read by a scanner and send this on, over any of the VTAP interfaces, including Bluetooth Low Energy (BLE) keyboard or BLE GATT.

Note: Bluetooth is only available on VTAP100-PRO-BW readers.

In this way both barcode/QR data and NFC card or wallet pass data can be sent on to a host system over a single interface from the VTAP reader.

The barcode type(s) supported depend only on the capabilities of the scanner connected. The VTAP reader will pass on to a host system whatever data comes from the scanner, over a serial or Bluetooth interface.

There are a number of scenarios where this functionality might be especially useful:

- Point-of-Sale (PoS) terminal at a café/retail outlet, which has limited space or connection options for supporting both a barcode reader and a VTAP reader at the same time.
- Ticket checking turnstiles for events, which need a very simple way to read a wide range of barcodes, QR codes, NFC cards/tags, mobile wallet and smart watch passes, and wearables.
- Gym or private members club access applications, which need to read a wide range of barcodes, QR codes, NFC cards/tags, mobile wallet and smart watch passes.

Setting up this facility requires a few changes to the `config.txt` file on your VTAP reader, which are described in this Application Note. If you need information about how configuration changes work more generally, please refer to the VTAP Configuration Guide.

2 Interfaces for barcode or QR scanners

VTAP readers can connect to barcode or QR scanners designed for serial or Bluetooth interfaces.

You will need to use a VTAP reader model which is able to receive **scanner input** on the right interface type to connect to your scanner, with another interface available, on which you would like to **output scanner data** from the VTAP reader.

Note: The interface connected for input from the barcode/QR scanner cannot also be used as a command interface or as an interface to output scanner or tap data from the VTAP reader.

Optionally, the output scanner data from the VTAP reader could be sent to VTAP Cloud. VTAP PRO readers can be directly connected to VTAP Cloud over Wi-Fi/Ethernet. This is also possible for VTAP100-USB readers, if they are connected to VTAP Cloud using VTAP Agent software on a Windows PC.

The following table will help you to select a VTAP reader model that suits your scanner interface and offers your preferred data output interface.

Scanner input interface	Compatible VTAP reader models	Output scanner data interface(s) available from VTAP reader						
		USB keyboard emulation	USB virtual COM port	RS-232	RS-485	Wiegand	Bluetooth (BLE Keyboard/ BLE GATT)	VTAP Cloud
RS-232	VTAP50-OEM	✓	✓	Used for scanner				With VTAP Agent
	VTAPI00-OEM	✓	✓	Used for scanner				With VTAP Agent
	VTAPI00-USB	✓	✓	Used for scanner				With VTAP Agent
	VTAPI00-PAC-485	✓		Used for scanner	✓			
	VTAPI00-PAC-W	✓		Used for scanner		✓		
	VTAPI00-PRO-BW	✓		Used for scanner			✓	✓
	VTAPI00-PRO-POE	✓	✓	Used for scanner				✓
RS-485	VTAPI00-PAC-485	✓	✓	✓	Used for scanner			
3.3V serial	VTAP50-OEM	✓	✓	Used for scanner				
Bluetooth	VTAPI00-PRO-BW	✓	✓	✓				✓

3 Connect an RS-232 serial scanner

Barcode scanners or QR scanners with an RS-232 output can be connected to VTAP100 and VTAP50 readers on the J1 header. J1 is a 2mm 8-way captive cable connector for power, USB and RS-232, which is present on all VTAP100 and VTAP50 readers.

3.1 Wiring RS-232 serial scanner input

The position of the J1 connector in current hardware is illustrated below. More details can be found in the installation or integration guide for your VTAP reader model.

Note: If the J1 connector is already used by a captive USB cable, then that cable will need to be replaced with a custom cable that can connect both USB and RS-232 at the same time.

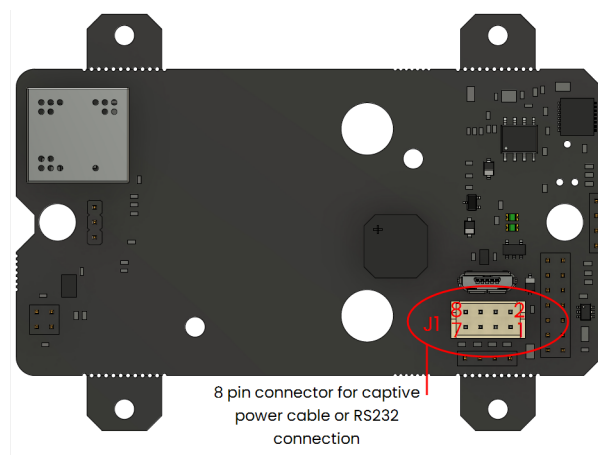


Figure 3-1 VTAP100 captive power cable or RS-232 J1 connection

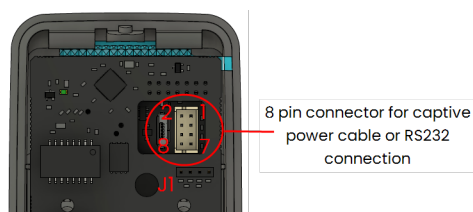


Figure 3-2 Access to J1 through cutaway in reader board assembly on some models

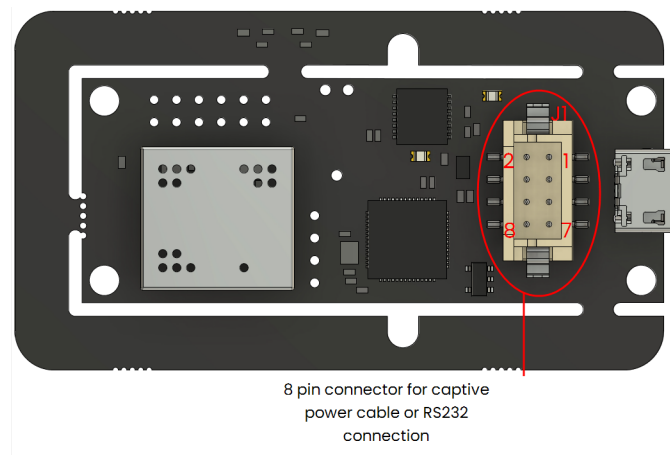


Figure 3-3 VTAP50 captive power cable or RS-232 J1 connection

A scanner will use pins 1,5,7 on a matching connector (Hirose DF11-8DS-2C or equivalent). If the VTAP reader power source, typically USB, can support the additional current requirement of your chosen scanner, then 5V on pin 3 could also be used to power the barcode or QR scanner.

This table shows the pin-to-pin connection between the J1 connector on your VTAP reader and your RS-232 barcode or QR scanner:

	VTAP100/VTAP50 J1 connector	RS-232 barcode or QR scanner
Pin 1	0V	0V
Pin 3	+5V	+5V
Pin 5	RS232-RX	RS232-TX
Pin 7	RS232-TX	RS232-RX

Note: Always ensure that 0V is connected between the VTAP reader and the barcode/QR scanner. The 5V pin 3 connection is only required if powering the scanner from the VTAP reader.

3.2 General configuration to use serial scanner

In most cases the output interface for scanner data will be the same one already in use for other VTAP tap data.

If you have a VTAP PRO reader in Cloud mode, its configuration will be set up and sent through VTAP Cloud. Contact vtap-support@dotorigin.com for help or more information.

For VTAP readers in Local mode, you should ensure that the following settings are in the `config.txt` file on your VTAP reader:

- `SerialScannerMode=1` to identify that a scanner input is connected on the RS-232 interface.
- If the `...Source` setting for the output interface is set to any value other than `=A5` (default), add `0x04` to the existing source bit value, to permit scanner data to be sent over that interface. (If the setting is not present in the `config.txt` file, the default value will allow scanner data through).
- If required, you could define a delimiter value to identify the end of a scanner payload using the `SerialScannerDelimiter` setting. The default is `=%0d` (carriage return).
- You might need to update the `SerialSettings`, to ensure that they match the serial settings of the barcode/QR scanner. The default is `=9600,n,8,1` where 9600 is baud rate, n is no parity, 8 data bits, 1 stop bit.

Other settings for this output port can be adjusted to suit your application. Refer to the VTAP Commands Reference Guide for a complete set of available configuration settings.

The VTAP reader interface you choose to output scanner data may require some extra configuration, described in the following examples. Choose any of the following, if they are available on your VTAP reader model:

- **Output serial scanner data over USB virtual COM port**
- **Output serial scanner data over RS-485**
- **Output serial scanner data over Bluetooth keyboard**
- **Output serial scanner data to VTAP Cloud**

3.3 Output serial scanner data over USB virtual COM port

Check whether either of these settings are already included in the `config.txt` file on your VTAP reader and, if so, that their values permit this new use of the virtual COM interface:

- If a `ComPortMode` setting is already included, ensure it reads `ComPortMode=1`, or delete the setting, to enable the virtual COM port. (The setting can simply be omitted because the virtual COM port is enabled by default, if not defined in the `config.txt` file).
- If a `ComPortSource` setting is already included, and is set to any value other than `=A5` (default), add `0x04` to the existing source bit value, to permit scanner data to be sent over the virtual COM interface. (Again, if this setting is not present in the `config.txt` file, the default value will allow scanner data through).

Example: RS-232 scanner data input with output on virtual ComPort over USB

```
!VTAPconfig
```

```
SerialScannerMode=1      ; Enable reading scanner input on Serial RS-232
SerialScannerDelimiter=%0a ; Treat new line as end of scanner input
ComPortSource=85        ; Add 0x04 (scanner) to 0x81 (passes and
                        ; cards/tags) assuming default A5 is
                        ; unsuitable for some reason
ComPortPostfix= %09Type:$t ; Include type of read data
                        ; (wallet pass, cards/tags or scanner)
```

This will result in scan data passed in the form `<barcode> Type:Q`, such as:
`ABC123456789 Type:Q`



3.4 Output serial scanner data over RS-485

The output can also be sent over the RS-485 interface with the option of OSDP secure communication.

Note: This option is only available on VTAP100-PAC-485 readers

If needed to match the host device, you can change `Serial2Settings` in `config.txt` to alter the RS-485 parameters for data transfer between the VTAP and the host device, from the `=9600,n,8,1` default.

Check whether any of these settings are already included in the `config.txt` file on your VTAP reader and, if so, that their values permit this new use of the RS-485 interface:

- If a `Serial2Mode` setting is already included, ensure it reads `Serial2Mode=1`, or delete the setting, to enable the serial2 interface. (The setting can simply be omitted because the serial2 interface is enabled by default, if not defined in the `config.txt` file).
- If a `Serial2RS485` setting is already included, ensure it reads `Serial2RS485=1`, or delete the setting, because this enables the use of the serial2 interface specifically for RS-485. (The setting can simply be omitted because the use of the serial2 interface for RS-485 is enabled by default, if not defined in the `config.txt` file).
- If a `Serial2Source` setting is already included, and is set to any value other than `=A5` (default), add `0x04` to the existing source bit value, to permit scanner data to be sent over the serial2 interface. (Again, if this setting is not present in the `config.txt` file, the default value will allow scanner data through).

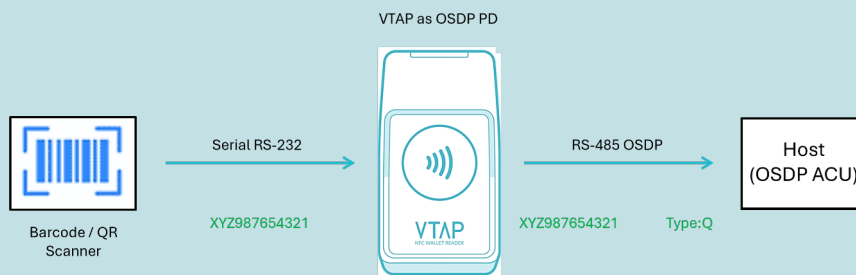
Refer to the VTAP100-PAC-485 Installation Guide for detailed instructions on appropriate RS-485 interface wiring and precautions.

Example: RS-232 scanner data input with output on RS-485 OSDP

```
!VTAPconfig
```

```
SerialScannerMode=1      ; Enable reading scanner input on Serial RS-232
SerialScannerDelimiter=%0a ; Treat new line as end of scanner input
Serial2Source=84         ; Add 0x04 (scanner) to 0x80 (passes only)
Serial2OSDP=1           ; Enable OSDP over RS485
Serial2OSDPAddress=1    ; Set the OSDP PD address of the VTAP to 1.
                        ; (addresses 1-255 are valid)
Serial2Postfix= %09Type:$t ; Include type of read data
                        ; (wallet pass, cards/tags or scanner)
```

This will result in scan data passed in the form <barcode> Type:Q, such as:
XYZ987654321 Type:Q



3.5 Output serial scanner data over Bluetooth keyboard

VTAP100-PRO-BW reader offers a Bluetooth output of NFC card or mobile wallet pass data that it reads. This can also be used to send the scanner data to a host device, such as a tablet, laptop or PoS terminal, as a Bluetooth Low Energy (BLE) keyboard or a custom BLE GATT service. (The example here uses Bluetooth keyboard. Refer to the VTAP Application Note on VTAP PRO BLE GATT server for detailed information on how to set up BLE GATT server with VTAP PRO readers.)

Note: This option is only available on VTAP100-PRO-BW readers

When used in Cloud mode, your VTAP100 PRO reader will be configured through the VTAP Cloud platform, with Bluetooth keyboard emulation settings to suit your application. The instructions which follow are for using a VTAP100 PRO reader in Local mode.

The Bluetooth keyboard output is disabled by default and can be enabled using the setting `BTKeyboardMode=1` in the `config.txt` file. Since the VTAP100 PRO reader will be emulating a Bluetooth keyboard to the host device, ensure that the cursor is in an appropriate position on the host device screen.

As soon as `BTKeyboardMode=1` has been added to the VTAP reader configuration your host device will be able to scan for and pair with the VTAP reader. The VTAP100-PRO-BW will now appear as a Bluetooth keyboard to nearby host devices, with the name <VTAP Serial number>, for example 'CC123456'. As no PIN is defined, you can pair and connect to a host device (such as a mobile phone or a PC with Bluetooth) without any PIN. (Refer to the VTAP100-PRO-BW User Guide for help with more complex connections between the VTAP PRO Bluetooth keyboard and a host device.)

If a `BTKeyboardSource` setting is already included in the `config.txt` file on your VTAP reader, and is set to any value other than `=A5` (default), add `0x04` to the existing source bit value, to permit scanner data to be sent over the Bluetooth interface. (If this setting is not present in the `config.txt` file, the default value will allow scanner data through).

Example: RS-232 scanner data input and output as Bluetooth keyboard (for a VTAP PRO in Local mode)

```
!VTAPconfig
```

```
CloudMode=0           ; VTAP PRO reader in Local mode
SerialScannerMode=1   ; Read scanner input on RS-232
SerialScannerDelimiter=%0a ; Treat new line as end of scanner input
BTKeyboardPrefix=BT_KB:%20 ; Prefix to identify any payload
                        ; received over Bluetooth keyboard
BTKeyboardMode=1     ; Enable Bluetooth keyboard emulation
BTKeyboardSource=85  ; Add 0x04 (scanner) to 0x81 (passes and
                        ; cards/tags) assuming default A5 is
                        ; unsuitable for some reason
```

This will result in scan data passed in the form BT_KB: <barcode>, such as:
BT_KB: XYZ987654321



3.6 Output serial scanner data to VTAP Cloud

When in Cloud mode, IP-connected VTAP PRO readers, can send NFC tap payloads to the VTAP Cloud platform. VTAP Cloud can be used to support applications such as loyalty, ticketing, fitness, couponing and CRM systems.

Note: This option is available on VTAP100-PRO readers, or VTAP100-USB readers using VTAP Agent software on a Windows PC.

Scanner data can be sent for processing by the VTAP Cloud in the same way as mobile wallet card tap data. VTAP PRO readers can either be pre-configured, or configured over VTAP Cloud, to suit your barcode scanner or QR scanner integration.

Contact vtap-support@dotorigin.com for help or more information about VTAP Cloud.

4 Connect a 3.3V serial scanner

VTAP50-OEM readers have a 3.3V logic interface, which is available on the optional 12-way expansion header (J2) and optional 12-way FFC connector (J6). The scanner data can then be output on the USB virtual COM port.

Note: This option is only available on VTAP50-OEM readers

Refer to the VTAP50-OEM Integration Guide for information on wiring connections.

Use the same `config.txt` settings to set up the 3.3V logic interface as for RS-232, which you'll find in the section **General configuration to use serial scanner data**.

Note: RS-232 and 3.3V serial present as different physical interfaces but use the same serial UART, so only one of these physical connections can be used to connect a barcode/QR scanner.

5 Connect a Bluetooth scanner

Barcode scanners or QR scanners that provide a Bluetooth Classic keyboard emulation mode can be connected to a VTAPI00-PRO-BW reader.

Note: This option is only available on VTAPI00-PRO-BW readers

1. If your VTAPI00-PRO-BW reader is in Cloud mode, its configuration will be set up and sent through VTAP Cloud. Contact vtap-support@dotorigin.com for help or more information.

If your VTAPI00-PRO-BW reader is in Local mode make the following changes in the `config.txt` file on your Local mode VTAP PRO reader to enable the Bluetooth scanner feature:

- Set `BTScannerMode=1` (because it is disabled by default, if not defined in `config.txt`).

When this is enabled and the VTAP PRO reader is not currently paired with a scanner, it will begin scanning to find the first barcode/QR scanner it can pair with, then will stop scanning for new devices. When the setting is disabled any paired devices are removed and forgotten.

- Set `BTScannerOutput` to define the output interfaces that the Bluetooth scanner data can be passed on to. Set `c` for output over ComPort, `s` for serial RS-232 and `k` for USB keyboard emulation. Multiple selections can be separated with commas such as `BTScannerOutput=c, s, k`
- Check whether the `...Source` setting for each output interface is set to any value other than `=A5` (default). If it is, add `0x04` to the existing source bit value, to permit scanner data to be sent over an interface. (If a `...Source` setting is not present in the `config.txt` file, the default value will allow scanner data through).

2. Switch on your scanner to a pairing/discovery mode.

The following are specific details for **Pairing and connecting with NETUM C750 barcode/QR scanner**.

- a. Switch on the NETUM scanner and press the top button once, enabling the pairing. The scanner will beep when button is pressed.
- b. The VTAPI00-PRO-BW will automatically detect and pair with the NETUM scanner. Once paired, the scanner will beep again and show stable blue LED (indicating an active connection).
- c. Now you can start using the NETUM scanner and barcodes/QR codes scanned by the NETUM scanner will be sent to the VTAP reader in the same way as an NFC wallet card payload.

To verify a successful pairing, power cycle the VTAPI00-PRO-BW and check the VCBOOT.txt file in a text editor on the VTAP PRO file system. (Alternatively, send a ?vcb command to the VTAPI00-PRO-BW over a serial interface and check the VTAP reader's response.)

VCBOOT.TXT or the ?vcb response will contain a line with the syntax:

Paired: <number of paired devices>,<names of the paired devices>.

For instance Paired: 1,C barcode scanner.

The VTAP reader interface you choose to output the scanner data may require some extra configuration, described in the following examples. Your options are:

- **Output Bluetooth scanner data over USB virtual COM port**
- **Output Bluetooth scanner data to VTAP Cloud**

5.1 Output Bluetooth scanner data over USB virtual COM port

Check whether either of these settings are already included in the `config.txt` file on your VTAP reader and, if so, that their values permit this new use of the virtual COM interface:

- If a `ComPortMode` setting is already included, ensure it reads `ComPortMode=1`, or delete the setting, to enable the virtual COM port. (The setting can simply be omitted because the virtual COM port is enabled by default, if not defined in the `config.txt` file).
- If a `ComPortSource` setting is already included, and is set to any value other than `=A5` (default), add `0x04` to the existing source bit value, to permit scanner data to be sent over the virtual COM interface. (Again, if this setting is not present in the `config.txt` file, the default value will allow scanner data through).

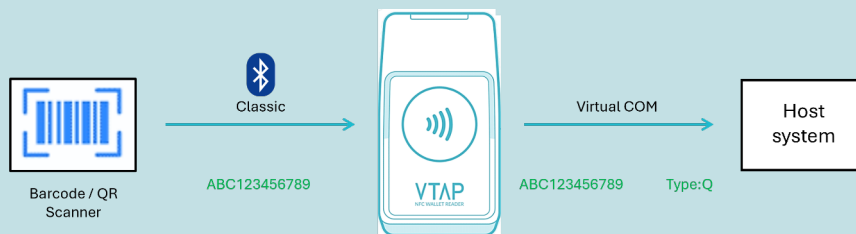
Example: Bluetooth scanner data input and output on virtual ComPort over USB

```
!VTAPconfig

CloudMode=0           ; VTAP PRO reader is in Local mode
BTScannerMode=1       ; Enable reading Bluetooth scanner input
BTScannerOutput=c     ; Output Bluetooth scanner data on ComPort only
ComPortSource=87      ; add 0x04 (scanner) to 0x83 (passes,
                       ; cards/tags and serial commands) assuming
                       ; default A5 is unsuitable for some reason

ComPortPostfix= %09Type:$t ; Include type of read data
                       ; (wallet pass, cards/tags or scanner)
```

This will result in scan data passed in the form `<barcode> Type:Q`, such as:
 ABC123456789 Type:Q



5.2 Output Bluetooth scanner data to VTAP Cloud

When in Cloud mode, IP-connected VTAPI00-PRO-BW readers, can send NFC tap payloads to the VTAP Cloud platform over Wi-Fi. This makes the communication fully wireless, which may suit applications where the scanner and VTAP reader are in the same vicinity but not close to each other, or to allow integration of an existing Bluetooth scanner into a VTAP reader environment.

Note: This option is available on VTAPI00-PRO-BW readers.

Scanner data can be sent for processing by the VTAP Cloud in the same way as mobile wallet card tap data. VTAPI00 PRO readers can either be pre-configured or configured over VTAP Cloud to suit your barcode scanner or QR scanner integration.

Contact vtap-support@dotorigin.com for help or more information about VTAP Cloud.

6 About Application Notes

Application Notes address topics of interest to small groups of customers, or topics around the use of a VTAP reader with third-party systems.

An Installation or Integration Guide for your VTAP reader model together with the VTAP Configuration Guide are the key documents to support the use of your VTAP reader. You will find the latest versions of these, and other useful information at <https://vtapnfc.com>.

If you need further help do contact us by email to vtap-support@dotorigin.com, or by phone +44 (0) 1428 685861 from Europe and Asia, or +1 (562) 262-9642 from Northern and Latin America.