VTAP

Application Note - VTAP NFC tag emulation

DOT ORIGIN

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**

Telephone UK and Europe: +44 (0) 1428 685861

Telephone North America and Latin America: +1 (562) 262-9642

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 VTAP NFC tag emulation

VTAP can emulate an NFC Forum Type 4 card or tag, containing NDEF encoded data. If you tap a phone on a VTAP in card emulation mode, a URL could be launched or Text data displayed on the tapping phone.

When a VTAP reader is switched into card emulation mode by the host system, for example under operator control, it can support scenarios such as:

- **Enrol users who do not have a wallet pass for your VTAP application**
  The VTAP is switched into card emulation mode, configured to offer a link to an enrolment website or app, by the system operator.
  When a user taps their phone on the VTAP they will be offered that link, to a website or an app, which will allow them to enrol or receive information about enrolment.

- **Provide targeted special offers or additional information on the user's phone**
  The VTAP is switched into card emulation mode, configured to emulate an NFC tag containing an appropriate web page URL.
  When a user taps their phone on the VTAP they will be offered that link, directing them to the special offer web page or other information.

1.1 Choose card emulation mode on the VTAP

The card emulation mode is set either by the setting `CardEmulationMode` in `config.txt`, or by the dynamic command `?cardmode` sent over any serial interface you have enabled.

There are three possible values to describe the card emulation mode:

- 0 - Card emulation mode disabled, VTAP operates only as an NFC reader
  (this is the default behaviour if `CardEmulationMode` is not set);

- 1 - VTAP operates only as an NFC card emulation;

- 2 - Mixed mode, where the VTAP is able to read tags and wallet passes but will also emulate a card that may be read by another device.

> **Note:** The behaviour of a phone presented to a VTAP in mixed mode can be unpredictable, if the phone itself is also enabled as both reader and card emulation. Unless the wallet app is disabled, current Apple and Android phones often automatically launch their wallet app when brought into the field of any NFC reader, to present the default payment card. This happens even when the reader is not requesting a pass or selecting a payment application.

1.2 Card emulation mode on start up

Setting `CardEmulationMode` in `config.txt` to one of these values 0, 1 or 2, determines the card emulation mode that will occur at start up, whenever the VTAP reader is power cycled or rebooted. By default, card emulation is disabled on start up, because the `CardEmulationMode` setting omitted from `config.txt`.

1.3 Dynamic change to card emulation mode

Any `?cardmode` command sent over a serial interface will override the initial `CardEmulationMode`setting in `config.txt`. Saving a change to `config.txt` will also change the current card emulation mode with immediate effect.

> **CAUTION:**If your application requires frequent switching of card emulation mode, we recommend that you always implement this using dynamic commands sent over a serial interface. Although the mode could be regularly changed by an update to `config.txt` file, doing so is likely to cause excessive memory wear, reducing the life of your VTAP reader.

Send the `?cardmode 1` command over any serial interface to change to enable card emulation mode. The VTAP will continue to perform card emulation until you send the command `?cardmode 0` to stop.

Although it is not recommended, you can send the `?cardmode 2` command over any serial interface you have enabled. This will make the VTAP perform card emulation but continue to behave as a reader, which is called 'mixed mode', until you send the command `?cardmode 0` to stop.

The VTAP will respond to every `?cardmode`command by returning the number of its current card emulation mode over the serial interface used. If you send the command `?cardmode` without specifying a new mode number 0, 1 or 2, the VTAP reader will still respond by returning the number of its current card emulation mode.

1.4 Set data to be sent from the VTAP in card emulation mode

You can specify the NDEF record that you want the VTAP reader to send when it is in card emulation mode.

There are two different types of NDEF record that the VTAP supports: **TEXT** and **URI**.

Use the **RAW** keyword to format any other required NDEF type, by supplying the hex byte values of the NDEF data.

As an alternative to specifying the NDEF data within the `config.txt` file, it can be provided in a separate file in the VTAP file system. This is specified by name using the **FILE** keyword.

The dynamic command for setting the card emulation data over a serial interface is `?card`. This is used as shown in the following examples:

- `?card TEXT,Hello World!` or `?card T,Hello World!` to send an NDEF text record such as 'Hello World!'

- `?card URI,http://www.vtapnfc.com` or `?card U,http://www.vtapnfc.com` to send the URL http://www.vtapnfc.com

- `?card RAW,D101055402656e4869` or `?card R,D101055402656e4869` to send raw NDEF data D101055402656e4869

- `?card FILE,tagdata.txt` or `?card F,tagdata.txt` to point to a file in the VTAP file system, here tagdata.txt, which contains the NDEF data.

Example: Setting in `config.txt` to start the VTAP in card emulation mode, with an NDEF TEXT record to send

```
!VTAPconfig

CardEmulationMode=1 ; Enable card emulation at start up

; Use =0 or omit setting to disable card emulation at start up
; Use =2 to enable mixed card emulation and reader behaviour at start up

CardEmulationData=TEXT,Hello World!

; Or use CardEmulationData=T,Hello World!
; Or use CardEmulationData=Hello World!
; since data without a type is assumed to be a text record.
; If a language descriptor is omitted 'en' will be used.
; Include a two character language descriptor such as nl, fr, es, de...
; to indicate text is from another language, in this case French:
; CardEmulationData=TEXT:fr,Bonjour le monde!
```

**Example: Setting in `config.txt` to set a URI as the NDEF record
to send from the VTAP in card emulation mode**

```
!VTAPconfig

CardEmulationData=URI,http://www.vtapnfc.com

; Or use CardEmulationData=U,http://www.vtapnfc.com
```

**Example: Setting in `config.txt` to set up a raw binary NDEF record
to send from the VTAP in card emulation mode**

```
!VTAPconfig

CardEmulationData=RAW,D101055402656e4869

; Or use CardEmulationData=R,D101055402656e4869
```

**Example: Setting in `config.txt` to use another file on the VTAP file
system to define the NDEF record
to send from the VTAP in card emulation mode**

```
!VTAPconfig

CardEmulationData=FILE,tagdata.txt

; Or use CardEmulationData=F,tagdata.txt
; This simply points to another file, here tagdata.txt, in the VTAP file
; system which in turn contains the NDEF record to send.
```

**Example: Contents of `tagdata.txt`, an example file containing data to be encoded as the NDEF record
to send from the VTAP in card emulation mode**

```
!VTAPconfig

CardEmulationData=TEXT,Hello World!

; Or any other CardEmulationData= format except the FILE option
; Including !VTAPconfig at the top of the file ensures that it will be
; reloaded automatically like the main config
```

Note: The NDEF types 'TEXT', 'URI', 'RAW' and 'FILE' are not case sensitive in any of these commands. So, for example, 'text' or 't' can be used instead of 'TEXT' or 'T'.

2 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.

The main documents available to support your use of the VTAP50 and VTAP100 are the Installation Guide for your VTAP reader model and the VTAP Configuration Guide. 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.