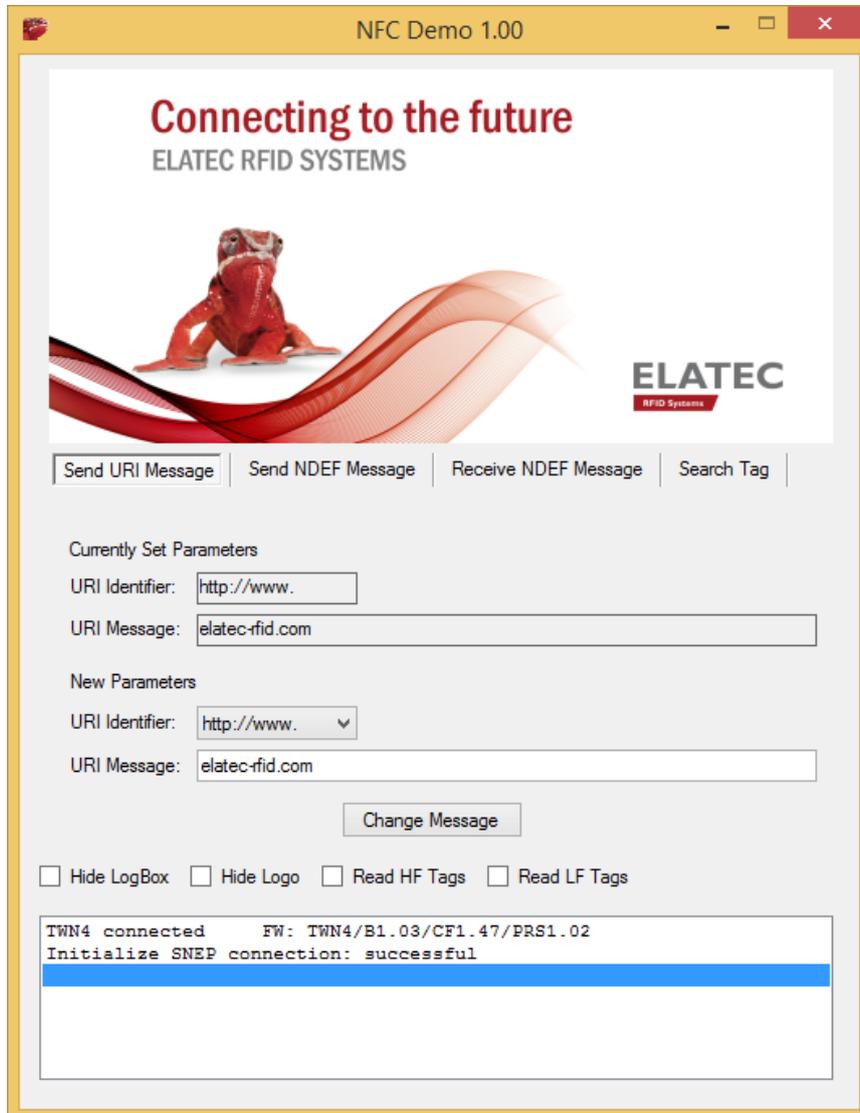


Application Note: NFC Demo

(AN NFC Demo DocRev1)



Contents

1 General Marks 3

1.1 NFC Data Exchange Format (NDEF) 3

1.2 Uniform Resource Identifier Messages (URI Messages) 4

2 NFC Demo 5

2.1 General Marks 5

2.2 Send URI Message 6

2.3 Send NDEF Message 6

2.4 Receive NDEF Message 7

2.5 Search Tag 7

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1 General Marks

1.1 NFC Data Exchange Format (NDEF)

The NFC Data Exchange Format (NDEF) is defined by the NFC Forum and is used to exchange data between two NFC devices. For example, NDEF messages can include v-cards, URLs, pictures or anything else. This document includes some information about these messages, which are needed to use the NFC Demo. For more information, please refer the NFC Forum NDEF specification.

NDEF Message			
NDEF Record 1 (MB = 1)	NDEF Record 2	...	Last NDEF Record (ME = 1)

Figure 1: Example of a NDEF message, with Message Begin (MB) in the first and Message End (ME) in the last record

A NDEF message can contain several NDEF records, as shown in Figure 1. Each record can be composed of different data sets. The first and last record must provide a Message Begin and Message End flag to denote begin and end of a NDEF message.

MB	ME	CF	SR	IL	TNF
Type Length					
Payload Length 3					
Payload Length 2					
Payload Length 1					
Payload Length 0					
ID Length					
Type					
ID					
Payload					

Figure 2: Structure of a NDEF Record

The structure of NDEF records is shown in Figure 2. The first byte is the header byte, which includes the following Flags:

- MB: Message Begin, is set in the first record of a message.
- ME: Message End, is set in the last record of a message.
- CF: Chunk Flag, is not supported in the NFC Demo, for information refer the NFC-Forum specification.
- SR: Short Record, is set, if the record length is smaller than 256 bytes. As result the Payload Length is one byte long (only Payload Length 0 is present).
- IL: ID Length, is set, if an ID length field is present. Otherwise the ID Length and ID field aren't present.
- TNF: Type Name Format of the record with 3 bit. The different types and values are shown in Figure 3

Also a record includes the Type Length, Payload Length (4 byte or 1 byte if SR is set), ID Length (if ID is present), Type, ID (if ID is present) and the Payload.

The Type defines the record type, for example, URI (URL) messages are defined as type 'U' or for v-cards "text/x-vcard". The record Type can be up to 255 characters, as well as the ID. The Payload of a record contains the data segments to exchange, which size can be up to 4GB.

Type Name Format	Value
Empty	0x00
NFC Forum well-known type [NFC RTD]	0x01
Media-type as defined in RFC 2046 [RFC 2046]	0x02
Absolute URI as defined in RFC 3986 [RFC 3986]	0x03
NFC Forum external type [NFC RTD]	0x04
Unknown	0x05
Unchanged (see section 2.3.3)	0x06
Reserved	0x07

Figure 3: Type Name Formats

1.2 Uniform Resource Identifier Messages (URI Messages)

URI messages are also specified by the NFC Forum. A message of this type is denoted with a 'U' in the type of a record. But this record type needs a second parameter, which is in the first byte of the payload. In this byte, the URI Identifier Code is defined. For further information of this code, please refer the NFC Forum URI Record Type Definition. The message data are available from the second byte of the payload.

NDEF Message				
NDEF Record				
Record Header	Type Length	Payload length	Type	Payload
MB, ME, SR, TNF=0x01	1	16	'U'	URI Identifier Code http://www. (0x01) + "elatec-rfid.com"
0xD1	0x01	0x10	0x55	0x01, 0x65, 0x6C, 0x61, 0x74, 0x65, 0x63, 0x2D, 0x72, 0x66, 0x69, 0x64, 0x2E, 0x63, 0x6F, 0x6D

Figure 4: NDEF Message example with an URI Message record

Figure 4 shows an example of a NDEF Message with one URI message record. In this case, the NDEF Message consists of one record, which includes the "elatec-rfid.com" URL. This is also the default message of the NFC Demo.

2 NFC Demo

2.1 General Marks

The NFC Demo is programmed in Visual Studio with the C# language, so it requires at least a .net framework with version 4.5. The software supports maximum two connected TWN4 on one computer and will connect to it automatically if the program is running or will be executed. The tool tests the firmware version of the TWN4, after the serial port is opened. To use this tool, a CDC firmware with minimum version CF1.47 and PRS1.02 is required.

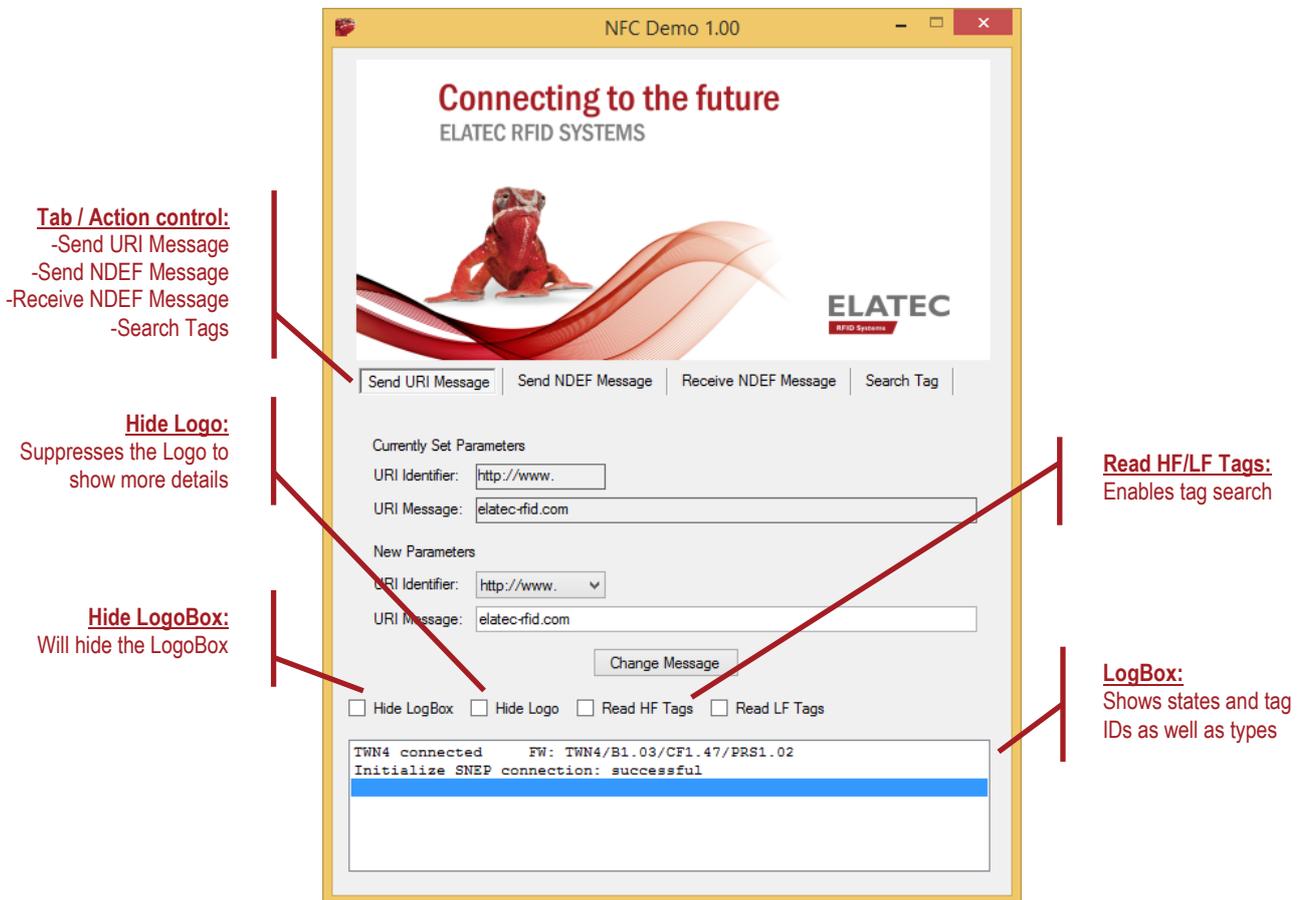


Figure 5: Start view of NFC Demo 1.00 GUI

2.2 Send URI Message

One function of the NFC Demo is to send URI Messages. Figure 6 shows the GUI segment to change this URI Message. The default URI Message is the “elatec-rfid.com” URL with the *URI Identifier* <http://www.>. The *Currently Set Parameters* shows the current sending message, which can be changed in the *New Parameters*. The button *Change Message* will put the new parameters to the current ones.

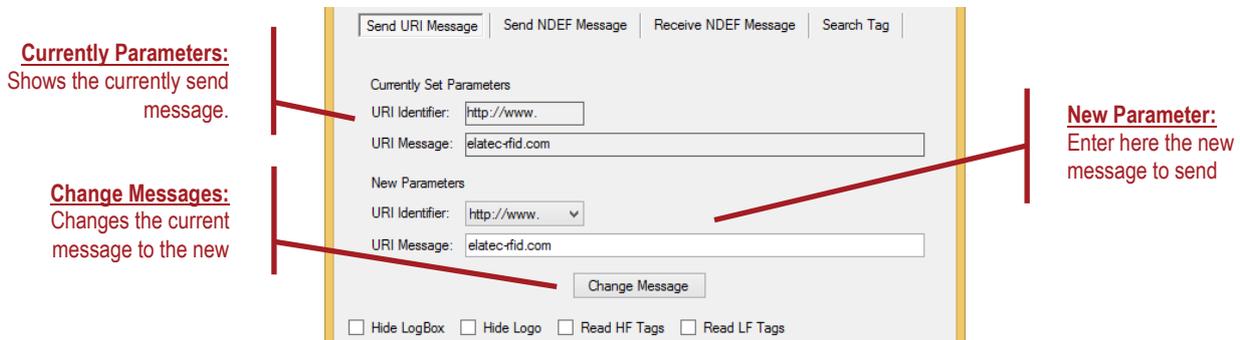


Figure 6: GUI segment view of Send URI Message

2.3 Send NDEF Message

The NFC Demo can also *send NDEF Messages* with multi-records. Therefore the tab *Send NDEF Messages* should be used, which is shown in Figure 7. In this tab records can be changed, deleted or new records can be added. Please note, every change of a record must be verified by the *Change Record* button.

The CheckBoxes on the left side of the TextBoxes enables the different segments of the NDEF Record. In Figure 7 the record includes a type and a payload. In this case the *ID* is disabled. The segments of the records can be entered in ASCII (UTF-8) or in hexadecimal format. This can be switched by the *Enter in Hex* CheckBox.

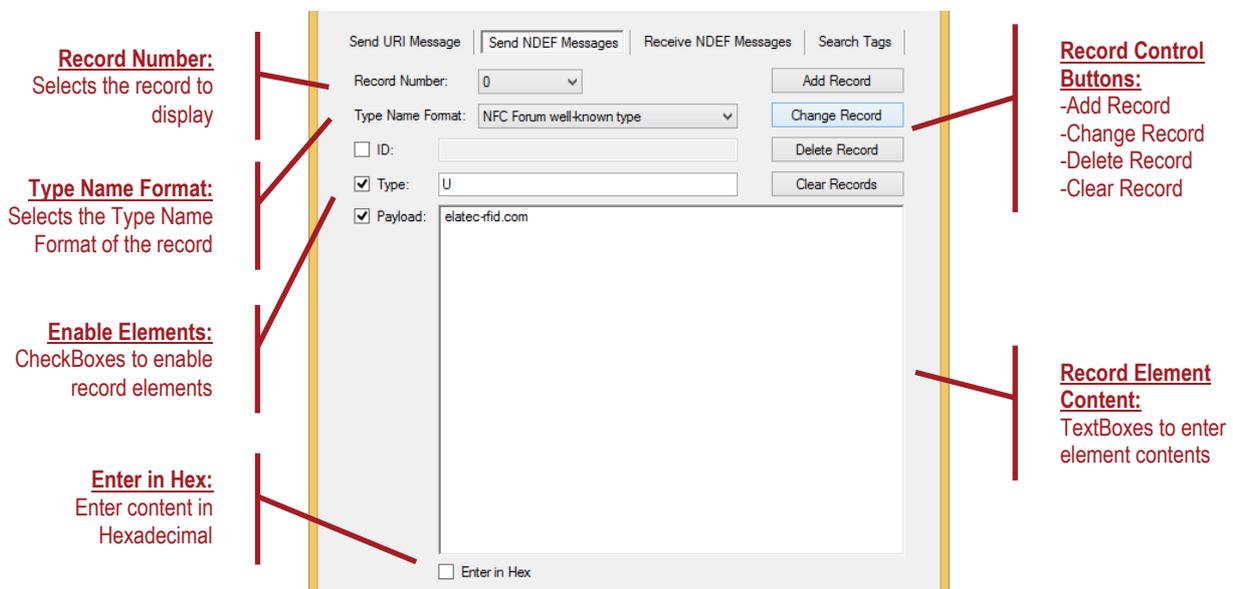


Figure 7: GUI segment view of Send NDEF Message

2.4 Receive NDEF Message

This function shows received NDEF Messages from other NFC devices. It provides two different views. Figure 8 shows the standard view, which structure is close to the *Send NDEF Message* tab. Here the different records will be shown in ID, Type and Payload. In this example a v-card is received from a mobile phone. The received message can be copied to the send NDEF tab by click the button Copy to Send. Also this tab provides an extended view, which shows the different records in Hex and ASCII format at the same time.

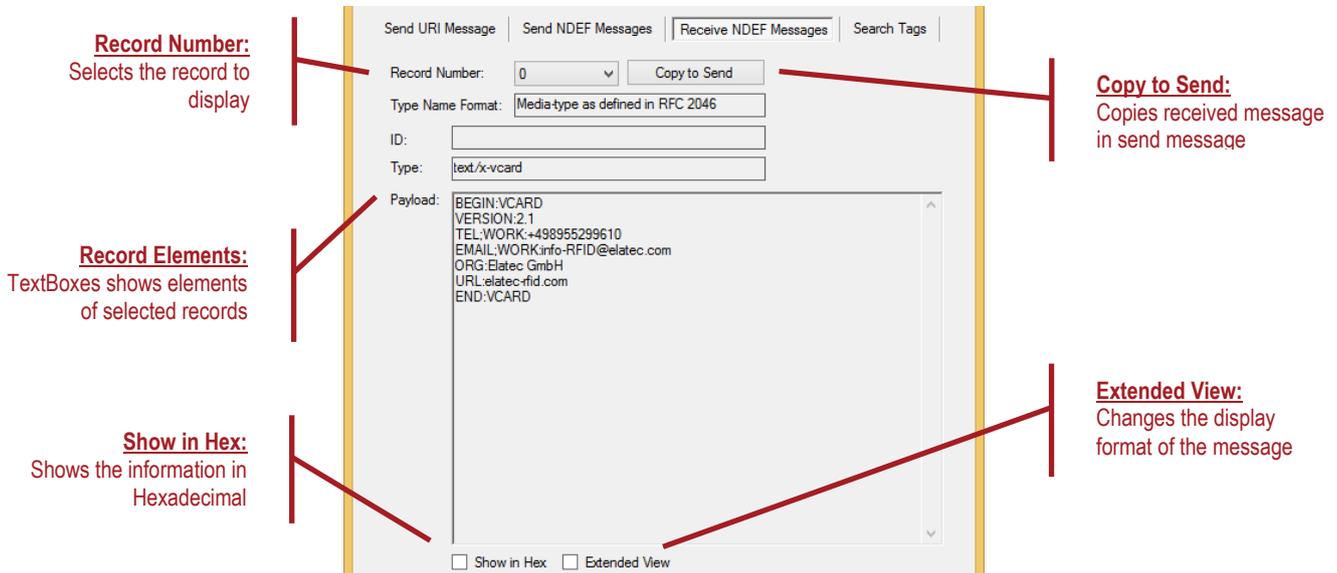


Figure 8: GUI segment view of Receive NDEF Message

2.5 Search Tag

The NFC Demo tool can also read all supported RFID tags of the TWN4. If the tab is active, the *Read HF Tags* and *Read LF Tags* will be enabled. The tool shows the found Tags with their ID and tag type. But also tags can be searched between the NFC functions, like *Send NDEF* or *Receive NDEF Message*. That means, if *Read HF Tags* or *Read LF Tags* is enabled, tags will be searched and displayed in the LogBox on the bottom of the GUI.

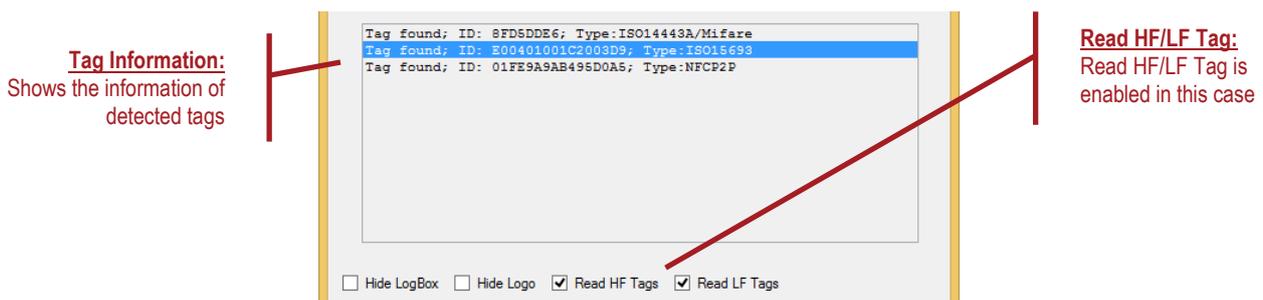


Figure 9: GUI segment view of Search Tag