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F. Dold
Taler Systems SA
C. Grothoff
BFH

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The 'payto' URI scheme for payments
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Abstract

This document defines the 'payto' Uniform Resource Identifier (URI) scheme for designating targets for payments.

Status of This Memo

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This Internet-Draft will expire on September 25, 2019.

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1. Introduction

This document defines the 'payto' Uniform Resource Identifier (URI) [RFC3986] scheme for designating targets for payments. In its simplest form, a 'payto' URL identifies a payment target type and optionally a target identifier. Additional parameters, such as an amount or a payment reference, can be provided.

The interpretation of the target identifier is defined by the payment target type, and typically represents either a bank account or an (unsettled) transaction.

A unified URI scheme for all payment target types allows applications to offer user interactions with URIs that represent payment targets, without delay and churn when new payment systems are introduced.

2. Syntax of a 'payto' URL

This document uses the Augmented Backus-Naur Form (ABNF) of [RFC5234].

```
payto-URI = "payto" "://" authority path-abempty [ "?" opts ]
opts = opt *( "&" opt )
opt = (generic-opt / authority-specific-opt) "=" *( pchar )
generic-opt = "amount" / "creditor-name" / "debitor-name" /
              "message" / "instruction"
authority = ALPHA *( ALPHA / DIGIT / "-" / "." )
path-abempty = <path-abempty, see [RFC3986], Section 3.3>
pchar = <pchar, see [RFC3986], Appendix A.>
```

3. Semantics

The authority component of a payment URI identifies the payment target type. The payment target types are defined in the Payto Payment Target Type Registry, see Section 8.2. The path component of the URI identifies the target for a payment as interpreted by the respective payment target type. The query component of the URI can provide additional parameters for a payment. Every payment method SHOULD accept the options defined in generic-opt. The default operation of applications that invoke a URI with the payto scheme SHOULD be to launch an application (if available) associated with the payment target type that can initiate a payment. If multiple handlers are registered for the same payment target type, the user SHOULD be able to choose which application to launch. This allows users with multiple bank accounts (each accessed the respective bank's banking application) to choose which account to pay with. Details of the payment MUST be taken from the path and options given in the URI. The user SHOULD be allowed to modify these details before confirming a payment.

4. Examples

```
payto://iban/DE75512108001245126199?amount=EUR:200.0&message=hello

INVALID (authority missing):  payto:iban/12345
```

5. Generic Options

Applications MUST accept URIs with options in any order. The "amount" option MUST only occur at most once. Other options MAY be allowed multiple times, with further restrictions depending on the payment method. The following options SHOULD be understood by every payment method.

amount: The amount to transfer, including currency information if applicable. The format MUST be:

```
amount = [ currency ":" ] unit [ "." fraction ]
currency = 1*ALPHA
unit = 1*(DIGIT / ",")
fraction = 1*(DIGIT / ",")
```

The unit value MUST be smaller than 2^53. If present, the fraction MUST consist of no more than 8 decimal digits. The use of commas is optional for readability and they MUST be ignored.

creditor-name: Name of the entity that is credited (receives the payment).

debitor-name: Name of the entity that is debited (makes the payment).

message: A short message to identify the purpose of the payment, which MAY be subject to lossy conversions (for example, due to character set encoding limitations).

instruction: A short message giving instructions to the recipient, which MUST NOT be subject to lossy conversions. Character set limitations allowed for such instructions depend on the payment method.

6. Internationalization and Character Encoding

Various payment systems use restricted character sets. An application that processes 'payto' URIs MUST convert characters that are not allowed by the respective payment systems into allowable character using either an encoding or a replacement table. This conversion process MAY be lossy, except for the instruction field.

To avoid special encoding rules for the payment target identifier, the userinfo component [RFC3986] is disallowed in payto URIs. Instead, the payment target identifier is given as an option, where encoding rules are uniform for all options.

7. Security Considerations

Interactive applications handling the payto URI scheme MUST NOT initiate any financial transactions without prior review and confirmation from the user, and MUST take measures to prevent clickjacking [HMW12].

Unless a payto URI is received over a trusted, authenticated channel, a user might not be able to identify the target of a payment. In particular due to homographs [unicode-tr36], a payment target type SHOULD NOT use human-readable names in combination with unicode in

the target account specification, as it could give the user the illusion of being able to identify the target account from the URL.

To avoid unnecessary data collection, payment target types SHOULD NOT include personally identifying information about the sender of a payment that is not essential for an application to conduct a payment.

8. IANA Considerations

8.1. URI Scheme Registration

The "payto" URI scheme is to be registered in the "Permanent URI Schemes" registry.

Scheme name: payto

Status: permanent

URI scheme syntax: See Section 2.

URI scheme semantics: See Section 3.

Applications/protocols that use this scheme name: payto URIs are mainly used by financial software, as well as by interactive applications (e.g. email clients, chat applications) that detect payto URIs and allow the user to interact with them (e.g. make them clickable)

Contact: grothoff@gnu.org

Change controller: grothoff@gnu.org

References: See References section of this document.

8.2. Payment Target Type Registry

This document defines a registry for payment methods. The name of the registry is "Payment Target Type Registry".

The registry shall record for each entry:

- Name: The name of the payment target type (case insensitive ASCII string, restricted to alphanumeric characters, dots and dashes)

- Description: A description of the payment target type, including the semantics of the path in the URI if applicable.

- Example: Example URI to illustrate the payment target type.

- Contact: The contact information of a person to contact for further information

- References: Optionally, references describing the payment method (such as an RFC) and method-specific options

The registration policy for this registry is "First Come First Served", as described in [RFC5226].

8.2.1. ACH Bank Account

- Name: ach

- Description: Automated Clearing House. The path consist of two components, the routing number and the account number.

- Example: payto://ach/122000661/1234

- Contact: N/A

- References: [NACHA]

8.2.2. Business Identifier Code

- Name: bic

- Description: Business Identifier Code. The path consist of just a BIC. This is used for wire transfers between banks. The registry for BICs is provided by SWIFT. The path does not allow specifying a bank account number.

- Example: payto://bic/SOGEDEFFXXX

- Contact: N/A

- References: [BIC]

8.2.3. International Bank Account Number

- Name: iban

- Description: International Bank Account Number (IBAN). Generally the IBAN allows to unambiguously derive the the associated Business Identifier Code (BIC). However, some legacy applications process payments to the same IBAN differently based on the

specified BIC. Thus the path can either consist of a single component (the IBAN) or two components (BIC and IBAN).

- Example: payto://iban/DE75512108001245126199
  payto://iban/SOGEDEFFXXX/DE75512108001245126199

- Contact: N/A

- References: [ISO20022]

8.2.4. Unified Payments Interface

- Name: upi

- Description: Unified Payment Interface. The path is an account alias. The amount and creditor-name options are mandatory for this payment target.

- Example: payto://upi/alice@example.com?creditor-name=Alice&amount=INR:200

- Contact: N/A

- References: [UPILinking]

8.2.5. Bitcoin Address

- Name: bitcoin

- Description: Bitcoin protocol. The path is a "bitcoinaddress" as per [BIP0021].

- Example: payto://bitcoin/12A1MyfXbW6RhdRAZEqofac5jCQQjwEPBu

- Contact: N/A

- References: [BIP0021]

8.2.6. Interledger Protocol Address

- Name: ilp

- Description: Interledger protocol. The path is an ILP address as per [ILP-ADDR].

- Example: payto://ilp/g.acme.bob

- Contact: N/A

- References: [ILP-ADDR]

9. References

9.1. Normative References

[ISO20022] International Organization for Standardization, "ISO 20022 Financial Services - Universal financial industry message scheme", May 2013.

[NACHA] NACHA, "NACHA Operating Rules & Guidelines", January 2017.

[RFC3986] Berners-Lee, T., Fielding, R., and L. Masinter, "Uniform Resource Identifier (URI): Generic Syntax", STD 66, RFC 3986, DOI 10.17487/RFC3986, January 2005, <https://www.rfc-editor.org/info/rfc3986>.

[RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", RFC 5226, DOI 10.17487/RFC5226, May 2008, <https://www.rfc-editor.org/info/rfc5226>.

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[unicode-tr36] Davis, M., Ed. and M. Suignard, "Unicode Technical Report #36: Unicode Security Considerations", September 2014.

9.2. Informational References

[BIC] International Organization for Standardization, "ISO 9362:2014 Business Identifier Code (BIC)", March 2019, <https://www.iso.org/standard/60390.html>.

[BIP0021] Schneider, N. and M. Corallo, "Bitcoin Improvement Proposal 21", January 2012, <https://en.bitcoin.it/wiki/BIP_0021>.

[HMW12] Huang, L., Moshchuk, A., Wang, H., Schecter, S., and C. Jackson, "Clickjacking: Attacks and Defenses", January 2012, <https://www.usenix.org/system/files/conference/usenixsecurity12/sec12-final39.pdf>.

[ILP-ADDR] Interledger Team, "ILP Addresses - v2.0.0", September 2018, <https://interledger.org/rfcs/0015-ilp-addresses/>.

[UPILinking]
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Authors' Addresses

Florian Dold
Taler Systems SA
7, rue de Mondorf
Erpeldange L-5421
LU

Email: dold@taler.net

Christian Grothoff
BFH
Hoeheweg 80
Biel/Bienne CH-2501
CH

Email: christian.grothoff@bfh.ch