URLs for Telephone Calls

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Abstract

   This document specifies URL (Uniform Resource Locator) schemes "tel",
   "fax" and "modem" for specifying the location of a terminal in the
   phone network and the connection types (modes of operation) that can
   be used to connect to that entity. This specification covers voice
   calls (normal phone calls, answering machines and voice messaging
   systems), facsimile (telefax) calls and data calls, both for POTS and
   digital/mobile subscribers.

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1. Introduction

1.1 New URL schemes

   This specification defines three new URL schemes: "tel", "fax" and
   "modem". They are intended for describing a terminal that can be
   contacted using the telephone network. The description includes the
   subscriber (telephone) number of the terminal and the necessary
   parameters to be able to successfully connect to that terminal.

   The "tel" scheme describes a connection to a terminal that handles
   normal voice telephone calls, a voice mailbox or another voice
   messaging system or a service that can be operated using DTMF tones.

   The "fax" scheme describes a connection to a terminal that can handle
   telefaxes (facsimiles). The name (scheme specifier) for the URL is
   "fax" as recommended by [E.123].

   The "modem" scheme describes a connection to a terminal that can
   handle incoming data calls. The term "modem" refers to a device that
   does digital-to-analog and analog-to-digital conversions; in addition
   to these, a "modem" scheme can describe a fully digital connection.

   The notation for phone numbers is the same which is specified in
   [RFC2303] and [RFC2304]. However, the syntax definition is a bit
   different due to the fact that this document specifies URLs whereas
   [RFC2303] and [RFC2304] specify electronic mail addresses. For
   example, "/" (used in URLs to separate parts in a hierarchical URL
   [RFC2396]) has been replaced by ";". In addition, this URL scheme has
   been synchronized with [RFC2543].

When these URLs are used, the number of parameters should be kept to
the minimum, unless this would make the context of use unclear.
Having a short URL is especially important if the URL is intended to
be shown to the end user, printed, or otherwise distributed so that
it is visible.

1.2 Formal definitions

The ABNF (augmented Backus-Naur form) notation used in formal
definitions follows [RFC2234]. This specification uses elements from
the 'core' definitions (Appendix A of [RFC2234]). Some elements have
been defined in previous RFCs. If this is the case, the RFC in
question has been referenced in comments.

Note on non-unreserved characters [RFC2396] in URLs: the ABNF in this
document specifies strings of raw, unescaped characters. If those
characters are present in a URL, and are not unreserved [RFC2396],
they MUST be escaped as explained in [RFC2396] prior to using the
URL. In addition, when parsing a URL, it must be noted that some
characters may have been escaped.

An example: ABNF notation "%x20" means a single octet with a
hexadecimal value of "20" (in US-ASCII, a space character). This must
be escaped in a URL, and it becomes "%20".

In addition, the ABNF in this document only uses lower case. The URLs
are case-insensitive (except for the <future-extension> parameter,
whose case-sensitivity is application-specific).

1.3 Requirements

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
"SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this
document are to be interpreted as described in [RFC2119].

Compliant software MUST follow this specification.

2. URL schemes for telephone calls

2.1 Applicability

In this document, "local entity" means software and hardware that can
detect and parse one or more of these URLs and possibly place a call
to a remote entity, or otherwise utilize the contents of the URL.

These URL schemes are used to direct the local entity to place a call
using the telephone network, or as a method to transfer or store a
phone number plus other relevant data. The network in question may be

   a landline or mobile phone network, or a combination of these. If the
   phone network differentiates between (for example) voice and data
   calls, or if the local entity has several different
   telecommunications equipment at its disposal, it is possible to
   specify which kind of call (voice/fax/data) is requested. The URL can
   also contain information about the capabilities of the remote entity,
   so that the connection can be established successfully.

   The "tel", "fax" and "modem" URL schemes defined here do not use the
   hierarchical URL syntax; there are no applicable relative URL forms.
   The URLs are always case-insensitive, except for the <future-
   extension> parameter (see below), whose case-sensitivity is
   application specific. Characters in the URL MUST be escaped when
   needed as explained in [RFC2396].

2.2 "tel" URL scheme

   The URL syntax is formally described as follows. For the basis of
   this syntax, see [RFC2303].

```
telephone-url         = telephone-scheme ":"
                          telephone-subscriber
telephone-scheme      = "tel"
telephone-subscriber  = global-phone-number / local-phone-number
global-phone-number   = "+" base-phone-number [isdn-subaddress]
                          [post-dial] *(area-specifier /
                          service-provider / future-extension)
base-phone-number     = 1*phonedigit
local-phone-number    = 1*(phonedigit / dtmf-digit /
                          pause-character) [isdn-subaddress]
                          [post-dial] area-specifier
                          *(area-specifier / service-provider /
                          future-extension)
isdn-subaddress       = ";isub=" 1*phonedigit
post-dial             = ";postd=" 1*(phonedigit /
                          dtmf-digit / pause-character)
area-specifier        = ";" phone-context-tag "=" phone-context-ident
phone-context-tag     = "phone-context"
phone-context-ident   = network-prefix / private-prefix
network-prefix        = global-network-prefix / local-network-prefix
global-network-prefix = "+" 1*phonedigit
local-network-prefix  = 1*(phonedigit / dtmf-digit / pause-character)
private-prefix        = (%x21-22 / %x24-27 / %x2C / %x2F / %x3A /
                          %x3C-40 / %x45-4F / %x51-56 / %x58-60 /
                          %x65-6F / %x71-76 / %x78-7E)
                          *(%x21-3A / %x3C-7E)
                          ; Characters in URLs must follow escaping rules
                          ; as explained in [RFC2396]
```

```
                             ; See sections 1.2 and 2.5.2
service-provider        = ";" provider-tag "=" provider-hostname
provider-tag            = "tsp"
provider-hostname       = domain ; <domain> is defined in [RFC1035]
                             ; See section 2.5.10
future-extension        = ";" 1*(token-char) ["=" ((1*(token-char)
                             ["?" 1*(token-char)]) / quoted-string )]
                             ; See section 2.5.11 and [RFC2543]
token-char              = (%x21 / %x23-27 / %x2A-2B / %x2D-2E / %x30-39
                             / %x41-5A / %x5E-7A / %x7C / %x7E)
                             ; Characters in URLs must follow escaping rules
                             ; as explained in [RFC2396]
                             ; See sections 1.2 and 2.5.11
quoted-string           = %x22 *( "\" CHAR / (%x20-21 / %x23-7E
                             / %x80-FF )) %x22
                             ; Characters in URLs must follow escaping rules
                             ; as explained in [RFC2396]
                             ; See sections 1.2 and 2.5.11
phonedigit              = DIGIT / visual-separator
visual-separator        = "-" / "." / "(" / ")"
pause-character         = one-second-pause / wait-for-dial-tone
one-second-pause        = "p"
wait-for-dial-tone      = "w"
dtmf-digit              = "*" / "#" / "A" / "B" / "C" / "D"
```

   The URL starts with <telephone-scheme>, which tells the local entity
   that what follows is a URL that should be parsed as described in this
   document. After that, the URL contains the phone number of the remote
   entity. Phone numbers can also contain subaddresses, which are used
   to identify different remote entities under the same phone number. If
   a subaddress is present, it is appended to the phone number after
   ";isub=". Phone numbers can also contain a post-dial sequence. This
   is what is often used with voice mailboxes and other services that
   are controlled by dialing numbers from your phone keypad while the
   call is in progress. The <post-dial> sequence describes what and when
   the local entity should send to the phone line.

   Phone numbers can be either "global" or "local". Global numbers are
   unambiguous everywhere. Local numbers are usable only within a
   certain area, which is called "context", see section 2.5.2.

   Local numbers always have an <area-specifier>, which specifies the
   context in which the number is usable (the same number may have
   different interpretation in different network areas). The context can
   be indicated with three different prefixes. A <global-network-prefix>
   indicates that the number is valid within a numbering area whose
   global numbers start with <global-network-prefix>. Similarly,
   <local-network-prefix> means that the number is valid within a

numbering area whose numbers (or dial strings) start with it. A
<private-prefix> is a name of a context. The local entity must have
knowledge of this private context to be able to deduce whether it can
use the number, see section 2.5.2. Additional information about the
phone number's usage can be included by adding the name of the
telephony services provider in <service-provider>, see section
2.5.10.

The <future-extension> mechanism makes it possible to add new
parameters to this URL scheme. See section 2.5.11.

The <private-prefix>, <token-char> and <quoted-string> nonterminals
may seem a bit complex at first, but they simply describe the set of
octets that are legal in those nonterminals. Some octets may have to
be escaped, see [RFC2396].

2.3 "fax" URL scheme

The URL syntax is formally described as follows (the definition
reuses nonterminals from the above definition). For the basis of this
syntax, see [RFC2303] and [RFC2304].

```
    fax-url          = fax-scheme ":" fax-subscriber
    fax-scheme       = "fax"
    fax-subscriber   = fax-global-phone / fax-local-phone
    fax-global-phone = "+" base-phone-number [isdn-subaddress]
                       [t33-subaddress] [post-dial]
                       *(area-specifier / service-provider /
                       future-extension)
    fax-local-phone  = 1*(phonedigit / dtmf-digit /
                       pause-character) [isdn-subaddress]
                       [t33-subaddress] [post-dial]
                       area-specifier
                       *(area-specifier / service-provider /
                       future-extension)
    t33-subaddress   = ";tsub=" 1*phonedigit
```

The fax: URL is very similar to the tel: URL. The main difference is
that in addition to ISDN subaddresses, telefaxes also have an another
type of subaddress, see section 2.5.8.

2.4 "modem" URL scheme

The URL syntax is formally described as follows (the definition
reuses nonterminals from the above definitions). For the basis of
this syntax, see [RFC2303].

```
        modem-url           = modem-scheme ":" remote-host
        modem-scheme        = "modem"
        remote-host         = telephone-subscriber *(modem-params
                              / recommended-params)
        modem-params        = ";type=" data-capabilities
        recommended-params  = ";rec=" data-capabilities
        data-capabilities   = accepted-modem ["?" data-bits parity
                              stop-bits]
        accepted-modem      = "V21" / "V22" / "V22b" /
                              "V23" / "V26t" / "V32" /
                              "V32b" / "V34" / "V90" /
                              "V110" / "V120" / "B103" /
                              "B212" / "X75" /
                              "vnd." vendor-name "." modem-type
        data-bits           = "7" / "8"
        parity              = "n" / "e" / "o" / "m" / "s"
        stop-bits           = "1" / "2"
        vendor-name         = 1*(ALPHA / DIGIT / "-" / "+")
        modem-type          = 1*(ALPHA / DIGIT / "-" / "+")
```

   The modem: URL scheme is also very similar to both the tel: and fax:
   schemes, but it adds the description of the capabilities of the
   remote entity. Minimum required compliance is listed in <modem-
   params> and recommended compliance is listed in <recommended-params>.
   For details, see section 2.5.9.

2.5 Parsing telephone, fax and modem URLs

2.5.1 Call type

   The type of call is specified by the scheme specifier. "Tel" means
   that a voice call is opened. "Fax" indicates that the call should be
   a facsimile (telefax) call. "Modem" means that it should be a data
   call. Not all networks differentiate between the types of call; in
   this case, the scheme specifier indicates the telecommunications
   equipment type to use.

2.5.2 Phone numbers and their scope

   <telephone-subscriber> and <fax-subscriber> indicate the phone number
   to be dialed. The phone number can be written in either international
   or local notation. All phone numbers SHOULD always be written in the
   international form if there is no good reason to use the local form.

   Not all numbers are valid within all numbering areas. The <area-
   specifier> parameter, which is mandatory for local numbers, is used
   to indicate the locale within which this number is valid, or to
   qualify the phone number so that it may be used unambiguously. The

<area-specifier> can take three forms: <global-network-prefix>,
<local-network-prefix> or <private-prefix>. These are used to
describe the validity area of the phone number either in global
numbering plan, local numbering plan, or in a private numbering plan,
respectively.

If <area-specifier> is present, the local entity MUST NOT attempt to
call out using the phone number if it cannot originate the call
within the specified locale. If a <local-phone-number> is used, an
<area-specifier> MUST be included as well.

There can be multiple instances of <area-specifier>. In this case,
the number is valid in all of the given numbering areas.

The global prefix form is intended to act as the outermost context
for a phone number, so it will start with a "+", followed by some
part of an E.164 number. It also specifies the region in which the
phone number is valid. For example, if <global-network-prefix> is
"+358", the given number is valid only within Finland (country code
358) - even if it is a <global-phone-number>.

The local prefix form is intended to act as an intermediate context
in those situations where the outermost context for a phone number is
given by another means. One example of use is where the local entity
is known to originate calls only within the North American Number
Plan Area, so an "outermost" phone context can be assumed. The local
context could, for example, be used to indicate the area code within
which an associated phone number is situated. Thus "tel:456-
7890;phone-context=213" would suffice to deliver a call to the
telephone number "+1-213-456-7890". Note that the version including
the <phone-context> implies further that the call can only be
originated within the "area code 213" region.

The <private-prefix> form is intended for use in those situations
where the context cannot be expressed with a start of a global phone
number or a dialing string. The <private-prefix> is actually a name
of a private context. The creator of the URL and the local entity
have been configured to recognize this name, and as such they can
interpret the number and know how they can utilize the number. For
example, a private network numbering plan may be indicated by the
name "X-COMPANY-NET", but the private dialling plan from the locales
of the sender of the telephony URL and the local entity are
different. The syntax of these tokens will be left for future
specification. The ABNF above specifies the accepted characters that
can be a part of <private-prefix>.

Unless the sender is absolutely sure that they share the same private
network access digit string with the local entity, then they MUST NOT
use a dialling plan number (a local phone number, or one qualified by
a local context), as the result may be incorrect. Instead, they
SHOULD use a global number, or if that is not possible, a private
context as the last resort. If the local entity does not support
dialling into the private network indicated by that context, then the
request MUST be rejected. If it does, then it will use the access
digit string appropriate for its locale.

Note that the use of <area-specifier> is orthogonal to use of the
telephony service provider parameter (see 2.5.10); it qualifies the
phone number, whilst the <service-provider> parameter indicates the
carrier to be used for the call attempt.

For example, a large company may have private network
interconnections between its sites, as well as connections to the
Global Switched Telephone Network. A phone number may be given in
"public network" form, but with a <service-provider> indicating that
the call should be carried over the corporate network.

Conversely, it would be possible to represent a phone number in
private network form, with a private context to indicate this, but
indicate a public telephony service provider. This would request that
the user agent convert the private network number plan address into a
form that can be carried using the selected service provider.

Any telephone number MUST contain at least one <phonedigit> or
<dtmf-digit>, that is, subscriber numbers consisting only of pause
characters are not allowed.

International numbers MUST begin with the "+" character. Local
numbers MUST NOT contain that character. International numbers MUST
be written with the country (CC) and national (NSN) numbers as
specified in [E.123] and [E.164]. International numbers have the
property of being totally unambiguous everywhere in the world if the
local entity is properly configured.

Local numbers MAY be used if the number only works from inside a
certain geographical area or a network. Note that some numbers may
work from several networks but not from the whole world - these
SHOULD be written in international form, with a set of <area-
specifier> tags and optional <service-provider> parameters. URLs
containing local phone numbers should only appear in an environment
where all local entities can get the call successfully set up by
passing the number to the dialing entity "as is". An example could be
a company intranet, where all local entities are located under a the
same private telephone exchange. If local phone numbers are used,

the document in which they are present SHOULD contain an indication
of the context in which they are intended to be used, and an
appropriate <area-specifier> SHOULD be present in the URL.

In some regions, it is popular to write phone numbers using
alphabetic characters which correspond to certain numbers on the
telephone keypad. Letters in <dtmf-digit> characters do not have
anything to do with this, nor is this method supported by these URL
schemes.

It should also be noted that implementations MUST NOT assume that
telephone numbers have a maximum, minimum or fixed length, or that
they would always begin with a certain number. Implementors are
encouraged to familiarize themselves with the international
standards.

2.5.3 Separators in phone numbers

All <visual-separator> characters MUST be ignored by the local entity
when using the URL. These characters are present only to aid
readability: they MUST NOT have any other meaning. Note that although
[E.123] recommends the use of space (SP) characters as the separators
in printed telephone numbers, spaces MUST NOT be used in phone
numbers in URLs as the space character cannot be used in URLs without
escaping it.

2.5.4 Converting the number to the local numbering scheme

After the telephone number has been extracted, it can be converted to
the local dialing convention. (For example, the "+" character might
be replaced by the international call prefix, or the international
and trunk prefixes might be removed to place a local call.) Numbers
that have been specified using <local-phone> or <fax-local-phone>
MUST be used by the local entity "as is", without any conversions,
unless the local entity decides to utilize the information in an
optional <service-provider> parameter.

2.5.5 Sending post-dial sequence after call setup

The number may contain a <post-dial> sequence, which MUST be dialled
using Dual Tone Multifrequency (DTMF) in-band signalling or pulse
dialing after the call setup is complete. If the user agent does not
support DTMF or pulse dialing after the call has been set up, <post-
dial> MUST be ignored. In that case, the user SHOULD be notified.

2.5.6 Pauses in dialing and post-dial sequence

   A local phone number or a post-dial sequence may contain <pause-
   character> characters which indicate a pause while dialing ("p"), or
   a wait for dial tone ("w").

   Local entities MAY support this method of dialing, and the final
   interpretation of these characters is left to the local entity. It
   is RECOMMENDED that the length of each pause is about one second.

   If it is not supported, local entities MUST ignore everything in the
   dial string after the first <pause-character> and the user SHOULD be
   notified. The user or the local entity MAY opt not to place a call if
   this feature is not supported and these characters are present in the
   URL.

   Any <dtmf-digit> characters and all dial string characters after the
   first <pause-character> or <dtmf-digit> SHOULD be sent to line using
   DTMF (Dual Tone Multifrequency) in-band signaling, even if dialing is
   done using direct network signaling (a digital subscriber loop or a
   mobile phone). If the local infrastructure does not support DTMF
   codes, the local entity MAY opt to use pulse dialing. However, it
   should be noted that certain services which are controlled using DTMF
   tones cannot be controlled with pulse dialing. If pulse dialing is
   used, the user SHOULD be notified.

2.5.7 ISDN subaddresses

   A phone number MAY also contain an <isdn-subaddress> which indicates
   an ISDN subaddress. The local entity SHOULD support ISDN
   subaddresses. These addresses are sent to the network by using a
   method available to the local entity (typically, ISDN subscribers
   send the address with the call setup signalling). If ISDN
   subaddressing is not supported by the caller, <isdn-subaddress> MUST
   be ignored and the user SHOULD be notified. The user or the local
   entity MAY opt not to place a call if this feature is not supported.

2.5.8 T.33 subaddresses

   A fax number MAY also contain a <t33-subaddress>, which indicates the
   start of a T.33 subaddress [T.33]. Local entities SHOULD support
   this. Otherwise <t33-subaddress> MUST be ignored and the user SHOULD
   be notified. The user or the local entity MAY opt not to place a call
   if this feature is not supported.

2.5.9 Data call parameters

   <modem-params> indicate the minimum compliance required from the
   local entity to be able to connect to the remote entity. The minimum
   compliance is defined as being equal to or a superset of the
   capabilities of the listed modem type. There can be several <modem-
   param> parameters, in which case compliance to any one of them will
   be accepted. <recommended-params> indicates the recommended
   compliance required from the local entity. This is typically the
   fastest and/or the most reliable modem type supported by the modem
   pool. The local entity can use this information to select the best
   number from a group of modem URLs. There can be several recommended
   modem types, which are equally desirable from the modem pool's point
   of view. <recommended-params> MAY NOT conflict with <modem-params>.
   If they do, the local entity MUST ignore the <recommended-params>.

   The local entity MUST call out using compatible hardware, or request
   that the network provides such a service.

   For example, if the local entity only has access to a V.22bis modem
   and the URL indicates that the minimum acceptable connection is
   V.32bis, the local entity MUST NOT try to connect to the remote host
   since V.22bis is a subset of V.32bis. However, if the URL lists V.32
   as the minimum acceptable connection, the local entity can use
   V.32bis to create a connection since V.32bis is a superset of V.32.

   This feature is present because modem pools often have separate
   numbers for slow modems and fast modems, or have different numbers
   for analog and ISDN connections, or may use proprietary modems that
   are incompatible with standards. It is somewhat analogous to the
   connection type specifier (typecode) in FTP URLs [RFC1738]: it
   provides the local entity with information that can not be deduced
   from the scheme specifier, but is helpful for successful operation.

   This also means that the number of data and stop bits and parity MUST
   be set according to the information given in the URL, or to default
   values given in this document, if the information is not present.

   The capability tokens are listed below. If capabilities suggest that
   it is impossible to create a connection, the connection MUST NOT be
   created.

   If new modem types are standardized by ITU-T, this list can be
   extended with those capability tokens. Tokens are formed by taking
   the number of the standard and joining together the first letter (for
   example, "V"), number (for example, 22) and the first letter of the
   postfix (for example "bis" would become "b").

Proprietary modem types MUST be specified using the 'vendor naming
tree', which takes the form "vnd.x.y", in which "x" is the name of
the entity from which the specifications for the modem type can be
acquired and "y" is the type or model of the modem. Vendor names MUST
share the same name space with vendor names used in MIME types
[RFC2048]. Submitting the modem types to ietf-types list for review
is strongly recommended.

New capabilities MUST always be documented in an RFC, and they MUST
refer to this document or a newer version of it. The documentation
SHOULD also list the existing modem types with which the newly
defined modem type is compatible with.

Capability	Explanation
V21	ITU-T V.21
V22	ITU-T V.22
V22b	ITU-T V.22bis
V23	ITU-T V.23
V26t	ITU-T V.26ter
V32	ITU-T V.32
V32b	ITU-T V.32bis
V34	ITU-T V.34
V90	ITU-T V.90
V110	ITU-T V.110
V120	ITU-T V.120
X75	ITU-T X.75
B103	Bell 103
B212	Bell 212
Data bits: "8" or "7"	The number of data bits. If not specified, defaults to "8".
Parity: "n", "e", "o", "m", "s"	Parity. None, even, odd, mark or space parity, respectively. If not specified, defaults to "n".
Stop bits: "1" or "2"	The number of stop bits. If not specified, defaults to "1".

2.5.10 Telephony service provider identification

It is possible to indicate the identity of the telephony service
provider for the given phone number. <service-provider> MAY be used
by the user-agent to place the call using this network, to enhance
the user interface, for billing estimates or to otherwise optimize
its functionality. It MAY also be ignored by the user-agent.
<service-provider> consists of a fully qualified Internet domain name
of the telephony service provider, for example
";tsp=terrifictelecom.com". The syntax of the domain name follows
Internet domain name rules and is defined in [RFC1035].

2.5.11 Additional parameters

   In addition to T.33 and ISDN subaddresses, modem types and area
   specifiers, future extensions to this URL scheme may add other
   additional parameters (<future-extension> in the BNF) to these URLs.
   These parameters are added to the URL after a semicolon (";").
   Implementations MUST be prepared to handle additional and/or unknown
   parameters gracefully. Implementations MUST NOT use the URL if it
   contains unknown parameters, as they may be vital for the correct
   interpretation of the URL. Instead, the implementation SHOULD report
   an error.

   For example, <future-extension> can be used to store application-
   specific additional data about the phone number, its intended use, or
   any conversions that have been applied to the number. Whenever a
   <future-extension> is used in an open environment, its syntax and
   usage MUST be properly documented in an RFC.

   <future-extension> nonterminal a rephrased version of, and compatible
   with the <other-param> as defined in [RFC2543] (which actually
   borrows BNF from an earlier version of this specification).

2.6 Examples of Use

      tel:+358-555-1234567

   This URL points to a phone number in Finland capable of receiving
   voice calls. The hyphens are included to make the number more human-
   readable: country and area codes have been separated from the
   subscriber number.

      fax:+358.555.1234567

   The above URL describes a phone number which can receive fax calls.
   It uses dots instead of hyphens as separators, but they have no
   effect on the functionality.

      modem:+3585551234567;type=v32b?7e1;type=v110

   This phone number belongs to an entity which is able to receive data
   calls. The local entity may opt to use either a ITU-T V.32bis modem
   (or a faster one, which is compatible with V.32bis), using settings
   of 7 data bits, even parity and one stop bit, or an ISDN connection
   using ITU-T V.110 protocol.

```
   tel:+358-555-1234567;postd=pp22
```

The above URL instructs the local entity to place a voice call to
+358-555-1234567, then wait for an implementation-dependent time (for
example, two seconds) and emit two DTMF dialing tones "2" on the line
(for example, to choose a particular extension number, or to invoke a
particular service).

```
   tel:0w003585551234567;phone-context=+3585551234
```

This URL places a voice call to the given number. The number format
is intended for local use: the first zero opens an outside line, the
"w" character waits for a second dial tone, and the number already
has the international access code appended to it ("00"). This kind of
phone number MUST NOT be used in an environment where all users of
this URL might not be able to successfully dial out by using this
number directly. However, this might be appropriate for pages in a
company intranet. The <area-specifier> which is present hints that
the number is usable only in an environment where the local entity's
phone number starts with the given string (perhaps singling out a
company-wide block of telephone numbers).

```
   tel:+1234567890;phone-context=+1234;vnd.company.option=foo
```

The URL describes a phone number which, even if it is written in its
international form, is only usable within the numbering area where
phone numbers start with +1234. There is also a proprietary extension
"vnd.company.option", which has the value "foo". The meaning of this
extension is application-specific. Note that the order of these
parameters (phone-context and vnd.company.option) is irrelevant.

2.7 Rationale behind the syntax

2.7.1 Why distinguish between call types?

   URLs locate resources, which in this case is some telecommunications
   equipment at a given phone number. However, it is not necessarily
   enough to know the subscriber number in order to successfully
   communicate with that equipment. Digital phone networks distinguish
   between voice, fax and data calls (and possibly other types of calls,
   not discussed in this specification). To be able to successfully
   connect to, say, a fax machine, the caller may have to specify that a
   fax call is being made. Otherwise the call might be routed to the
   voice number of the subscriber. In this sense, the call type is an
   integral part of the 'location' of the target resource.

The reason to have the call type in the scheme specifier is to make
the URL simple to remember and use. Making it a parameter, much like
the way modem parameters are handled now, will substantially reduce
the human readability of this URL.

2.7.2 Why "tel" is "tel"?

There has been discussion on whether the scheme name "tel" is
appropriate. To summarize, these are the points made against the
other proposals.

       callto   URL schemes locate a resource and do not specify
                   an action to be taken.
       telephone   Too long. Also, "tel" considered to be a more
                   international form.
       phone   Was countered on the basis that "tel" is more
                   internationally acceptable.

2.7.3 Why to use E.164-style numbering?

E.164 refers to international telephone numbers, and the string of
digits after the country code is usually a national matter. In any
case, phone numbers are usually written as a simple string of numbers
everywhere. Because of this, the syntax in this specification is
intuitively clear to most people. This is the usual way to write
phone numbers in business cards, advertisements, telephone books and
so on.

It should be noted that phone numbers may have 'hierarchical'
characteristics, so that one could build a 'forest' of phone numbers
with country codes as roots, area codes as branches and subscriber
numbers as leaves. However, this is not always the case. Not all
areas have area codes; some areas may have different area codes
depending on how one wants to route the call; some numbers must
always be dialled "as is", without prepending area or country codes
(notably emergency numbers); and area codes can and do change.

Usually, if something has a hierarchical structure, the URL syntax
should reflect that fact. These URLs are an exception.

Also, when writing the phone number in the form described in this
specification, the writer does not need to know which part of the
number is the country code and which part is the area code. If a
hierarchical URL would be used (with a "/" character separating the
parts of the phone numbers), the writer of the URL would have to know
which parts are which.

Finally, when phone numbers are written in the international form as
specified here, they are unambiguous and can always be converted to
the local dialing convention, given that the user agent has the
knowledge of the local country and area codes.

2.7.4 Not everyone has the same equipment as you

There are several ways for the subscriber to dial a phone number:

   - By pulse dialing. Typically old telephone exchanges. Usually this
   dialing method has only to be used to set up the call; after
   connecting to the remote entity, <post-dial> can be sent to the
   line using DTMF, because it will typically be processed by the
   remote entity, not the telephone network.

   - By DTMF. These are the 'beeps' that you hear when you dial on
   most phones.

   - By direct network signalling. ISDN subscribers and mobile phone
   users usually have this. There is no dial tone (or if there is, it
   is generated locally by the equipment), and the number of the
   called party is communicated to the telephone network using some
   network signalling method. After setting up the call, <post-dial>
   sequences are usually sent using DTMF codes.

2.7.5 Do not confuse numbers with how they are dialled

As an example, +123456789 will be dialled in many countries as
00123456789, where the leading "00" is a prefix for international
calls. However, if a URL contains a local phone number 00123456789,
the user-agent MUST NOT assume that this number is equal to a global
phone number +123456789. If a user-agent received a telephony URL
with a local number in it, it MUST make sure that it knows the
context in which the local phone number is to be processed, or else
the number MUST NOT be used. Equally, anyone sending a telephony URL
MUST take into consideration that the recipient may have insufficient
information about the phone number's context.

3. Comments on usage

These are examples of the recommended usage of this URL in HTML
documents.

First of all, the number SHOULD be visible to the end user, if it is
conceivable that the user might not have a local entity which is able
to use these URLs.

   Telephone: +358-555-1234567

Second, on a public HTML page, the telephone number in the URL SHOULD always be in the international form, even if the text of the link uses some local format.

   Telephone: (0555) 1234567

or even

   For more info, call 1-555-IETF-RULZ-OK.

Moreover, if the number is a <local-phone-number>, and the scope of the number is not clear from the context in which the URL is displayed, a human-readable explanation SHOULD be included.

   For customer service, dial 1234 (only from Terrific Telecom mobile phones).

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5. Security Considerations

   It should be noted that the local entity SHOULD NOT call out without
   the knowledge of the user because of associated risks, which include

   - call costs (including long calls, long distance calls,
     international calls and premium rate calls, or calls which do not
     terminate due to <post-dial> sequences that have been left out by
     the local entity)

   - wrong numbers inserted on web pages by malicious users, or sent via
     e-mail, perhaps in direct advertising

   - making the user's phone line unavailable (off-hook) for a malicious
     purpose

   - opening a data call to a remote host, thus possibly opening a back
     door to the user's computer

   - revealing the user's (possibly unlisted) phone number to the remote
     host in the caller identification data, and correlating the local
     entity's phone number with other information such as the e-mail or
     IP address

   - using the same local number in different contexts, in which the
     number may have a different meaning

   All of these risks MUST be taken into consideration when designing
   the local entity.

The local entity SHOULD have some mechanism that the user can use to filter out unwanted numbers. The local entity SHOULD NOT use rapid redialing of the number if it is busy to avoid the congestion of the (signaling) network. Also, the local entity SHOULD detect if the number is unavailable or if the call is terminated before the dialing string has been completely processed (for example, the call is terminated while waiting for user input) and not try to call again, unless instructed by the user.

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   All phone numbers and company names used in the examples of this specification are fictional. Any similarities to real entities are coincidental.

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Acknowledgement