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                                                      April 1999

                        **The "btv" URN Scheme**
                        **draft-finseth-btv-00.txt**

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Status of this Memo

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   does not specify an Internet standard of any kind.  Distribution of
   this memo is unlimited.

Abstract

   This document defines a new URI scheme, "btv".  This scheme provides
   a mechanism by which "resources" -- which includes virtual channels,

events, applications, and data modules -- can be referenced from
within a TV broadcast stream, from other broadcast streams, or from
the Internet.

Environment

   The environment is television.  In this environment, you have a
   receiver that picks up one or more signals and deal with them.
   (We'll use the term "receiver" to denote the box or module that does
   the work.)  There are a couple of points to keep in mind.

   First, the receiver may have only one source of signal, or it may
   have many.  Typically, inputs can come from:

           - over-the-air antenna (NTSC, ATSC, DVB, potentially other
   formats)
           - cable feed (potentially a variety of formats)
           - satellite feed (again, a variety of formats)

   in any combination.

   Second, the receiver may be stand alone, or it may be connected to
   some form of "back channel."  The back channel may be proprietary or
   general-purpose (e.g., a network connection). The channel may be in
   the form of a phone line, DSL, cable modem, general LAN connection,
   etc.


Description

   The requirements that any TV broadcast URI scheme must meet are
   complex.  The URI must connect a use of a resource with the
   definition of the resource.  It must make this connection even though
   the resource may be transmitted in ways not forseen by the original
   author.

   A full summary of the requirements that such a scheme must meet is
   given in [1].  This document will not repeat that discussion.
   Rather, this document will specify the syntax and semantics of a URI
   scheme that meets those requirements.

   The general idea is that a URI is resolved by a TV receiver using
   translation information which is delivered to it in the broadcasts it
   receives. Thus, a URI may represent a resource which is broadcast by
   different terrestrial, cable, and satellite broadcasters in different
   locations, and which is therefore received by different TV receivers
   via different channels and even different broadcast protocols. These
   TV receivers can each correctly resolve the URI to the physical

broadcast parameters which represent the referenced resource in their
circumstances by making use of translation information which is
specific to their circumstances.

One-Paragraph Summary

Each resource -- such as a virtual channel, event, application, or
data file -- is identified by a URI.  The URIs are globally unique
(conceptually) opaque tags and are assigned by the creator of the
content.  The information necessary to map the URI to the actual
resource is carried in each transport stream in a transport-stream
specific manner.  These specifics are invisible to the application:
it simply uses the URI in an accustomed manner to access the
resource.

Syntax

The TV broadcast URIs fully comply with the syntax called out in
[RFC2396].  This document will not review the entire syntax.  Rather,
it will just highlight the specifics.  Numbers in {}s refer to RFC
2396 section numbers.

TV broadcast URIs are simultaneously URIs and URNs {1.2}.  The term
"URI" will continue to be used to refer to the collection.  They are
technically URLs as well, but only in a trivial way.

TV broadcast URIs are hierachical and the relative forms are fully
supported {1.4}.

The standard character set restrictions and operations (e.g. quoting)
are used {2.}.

This document does not specify a maximum length of a TV broadcast
URI.  Content authors should consult the set of instantiation
documents covering their target systems to determine any limitations
on length.

The standard form {3.} is:

        btv://<authority><path>?<query>

The <authority> part is a registration-based naming authority.  The
registration is the Domain Name System {3.2}.  Note that the
<authority> part is not expected to ever be resolved via DNS servers.
Further, the <authority> part must be a name: a numeric identifier
(such as IP address) is not permissible {3.2.2}.

   The server-based portions (including "<userinfo>@" and ":<port>")
   will not be used {3.2.1}.

   Path component interpretation is as specified in {3.3}.

   Query components are permitted; interpretation is as specified in
   {3.4}.

   Fragment identifiers are permitted; interpretation is as specified in
   {4.1}.

   Relative URI references are permitted within an application (see next
   note). However, all URIs will be converted to fully-qualified form
   before being passed to the environment for lookup {5.}.

   Base URIs can be obtained from the Document Context, the Retrieval
   URI, and the default Base URI.  The Encapsulating Entity form is not
   meaningful and not permitted.  Also, for Retrieval URIs, redirection
   is not meaningful and is not permitted. {5.1.}

   The default Base URI is the URI explicitly associated with the
   invoking application.  In the case where the invoking application is
   the system or is not clear, the default Base URI is not defined and
   relative forms are not permitted. {5.1.4}

Semantics

   From an application's viewpoint, a TV broadcast URI is simply an
   opaque string that is passed to the system for lookup.  The system
   then uses infomration obtained from other sources to associate the
   opaque string with the actual resource.  The actual resourse may be
   specified directly (e.g., by values transmitted in mapping tables),
   or indirectly by, for example, a transport-specific URL.  (This is
   exactly the same model as is used for looking up traditional "http:"
   URLs.)

   This scheme assumes that there will be some "directory-type"
   information available to the system to perform the mapping.  As this
   is presumably the same information used by the system to actually
   perform its other tasks, the mapping can be assumed to be complete
   and correct.

           "Directory-type" information includes what is commonly
           referred to as "PSIP" information: virtual channel tables,
           event information tables, system description tables, etc.
           and possible extentsions to that information.  The specific
           names and formats of such tables will vary from one
           transmission mthod to another. In some cases, data may even

be entered manually.

TV broadcast URIs have three key properties:

1. URIs are considered to match when a <u>case</u> <u>independent</u> string
comparison between the two returns True.  Comparisons are always
performed on the fully-qualified forms.

>           Note: case indepdendent path portions were selected for
>           ease of implementation.  [RFC 2396](RFC 2396) does not specify whether
>           the path portion is case indepdendent (the assigning
>           authority and scheme portions must be compared case
>           independent).

2. More than one resource may be identified by the same URI.  Hence,
a list of matching resources would be returned.

3. A given resource may be identified by more than one URI.  Hence,
the same resource may be returned by more than one request.

Note that while URIs can reference resources that are only available
at particular times, the URIs themselves do not explicitly encode any
time-related information: any such information is carried by other
mechanisms.  However, a URI may reference an "event" (e.g., a TV
program) and that event does carry a time context.

Resources to be Named

We have identified the following types of resources that could be
named with TV broadcast URIs.  This list is not part of the
specification, but is included to help understand how it is used.

Note that the <authority> portion identifies the entity that made the
assignment.

The first two resources identify levels of transmission multiplex
"bundling."

1. A transmission multiplex.

For example, the ABC network feed.  These might be named:

```
        btv://abc.com/
or:     btv://abc.com/feed
or:     btv://feed.abc.com/
```

2. A particular virtual channel.

This resource identifies a particular virtual channel.  Virtual
channels might be named:

```
        btv://chan.abc.com/
or:     btv://abc.com/chan/
        btv://chan.kstp.com/
or:     btv://kstp.com/chan/

        btv://hbo.com/chan
```

The first two indicate the typical case of a network feed with local
affiliate.  (KSTP is the ABC affiliate in the Minneapolis/St. Paul
area.)  Both names would be attached to the same virtual channel.

Note that there is no need for the numeric form (Channel 5).  If the
local affiliate were to embed a URI in web content, the context would
just be:

```
        ...<a href="btv://kstp.com/">tune to Channel 5 now</a>...
```

This same form would work on web content found in the Internet
(assuming that the device had a tuner and was able to receive KSTP's
signal), in content found in the TV broadcast stream, or any other
content.

Since virtual channel numbers in a TV are re-used, an application can
not usefully <u>ever</u> use the virtual channel number alone.  Instead, it
must refer to the context to determine how to name the desired
resource.  Given such a lookup, the alphabetic form of the name is no
more effort to use than the numeric form.

Note that the national network can use the form:

```
        ...<a href="btv://abc.com/">tune to ABC now</a>...
```

and cause tuning to the local affiliate (assuming there is one) from
anywhere.

While there may be some exceptions, TV broadcast URIs are intended
mainly for internal use by the system and not for presentation to
viewers.  The following example illustrates why.

HBO (and many other networks) have multiple feeds: in the U.S., they
have both an East and West coast feed, with the West coast feed
ordinarily carrying the same content as the East coast feed, but with
a three hour delay (live events are carried at the same time on
both).

Local providers (e.g., cable systems) on the East coast ordinarily
carry the East coast feed and call it "HBO".  Local providers on the
West coast ordinarily carry the West coast feed and also call it
"HBO".  Nationwide providers (e.g., satellite systems) may carry both
feeds but must use different names (often "HBO" for the East coast
feed and "HBOW" or "HBOP" for the West coast feed).  Note that cable
and satellite systems offer identical content on the West coast feed,
but present that content under two user-visible names, said name
depending upon the transmission path.

This URI scheme avoids problem by separating the URI naming from the
user-visible naming.  The provider can use the same URI whenever the
content is the same.  Note that the same content is just that: it's
the same string of bits, even if shifted in time.

For example, a promotional spot might need a background GIF resource
named:

        btv://hbo.com/promotions/ad1453/background.gif

It can (and should) use the same name whenever the resource appears
in the transmission.  The provider can use its normal scheduling
mechanisms to handle staging of the varoius feeds.

The next block of resources identify various combinations of event
material.

3. A collection of event material.

For example, the set of Gilligan's Island episodes in the schedule.
This resource might be defined by attaching a URI like this:

        btv://gilligans-island.com/

to each episode in the schedule.  A typical use of this form of URI
might be on the Gillian's Island web page.  It might have a reference
to:

        ...and click <a href="btv://gilligans-island.com/">here</a>
        to see a when and where it is on in <i>your</i> city...

4. A particular episode of a event series.

For example, the "Trouble with Tribbles" episode of the original Star
Trek.  This resource might be defined by a URI of one of these forms:

        btv://trouble-with-tribbles.startrek.com/
        btv://startrek.com/trouble-with-tribbles

        btv://startrek.com/2nd-season/trouble-with-tribbles

   This specification does not identify which form is preferred: just as
   with "normal" web URLs, the preferred form is selected by the
   organization named in the <authority> portion.

   In many cases, material with a the specific episode URI would also
   have a generic series URI:

        btv://trouble-with-tribbles.startrek.com/
        btv://startrek.com/

   5. A particular showing of a event.

   For example, the "Trouble with Tribbles" episode of the original Star
   Trek that ran on Nov 16, 1998 at 10:00pm on virtual channel 5 in
   Minneapolis/St. Paul Angeles.  This resource might be identified by a
   URI of the form:

        btv://kstp.com/trouble-with-tribbles/startrek.com

   The URI would be placed <u>only</u> on the showing for the specified virtual
   channel and at the specified time.

   The naming of this example assumes that the local station is the
   source of the reason for the reference.  For example, there is a
   promotion in conjunction with a local Star Trek convention.  A more
   typical name might be:

        btv://kstp.com/promotion/star-trek/19981116

   The point is, the organization creating the reference can use
   whatever name best suits their purpose.

   6. Event material that appears someplace in the time/virtual
   channel/provider continuum.

   For example, the January 1999 Super Bowl.  This event might carry the
   URI:

        btv://super-bowl-Jan-1999.com/

   or even just,

        btv://super-bowl.com/

   Given that only one is likely to show up in the schedule at a time.
   As with the nationwide network example, the reference can be embedded

   as:

            ...and click <a href="btv://super-bowl.com/">here</a> to
            schedule your TV to tune to the Super Bowl!...

   Again, this reference is only useful if the viewer can actually
   receive the Super Bowl broadcast and it is in the available event
   guide.  It also assumes that references to events in the future can
   integrate to a scheduling system (this situation is common in
   satellite and cable set-top boxes).

   7. A particular once-only event.

   All of the previous examples referred to events that were in some
   sense repeating or part of a series.  The same forms and concepts
   apply to once-only events.  The organization responsible assigns the
   URI and it is attached to the appearances.

   The last two points identify "data"-oriented resources.

   8. A particular application.

   URIs can be attached to the applications themselves.  These URIs can
   be used in two ways.

   First, they identify applications to each other for inter-process
   communications.

   Second, the default Base URI for the application is established by
   the act of naming the application itself.

   Example names might be:

            btv://coke.com/commercial45/application
            btv://abc.com/promo5.html

   9. A particular data item referenced by an application.

   Examples are image files (JPEGs, GIFs), sounds, data streams, etc.

   For example,

            btv://coke.com/commercial45/application/background.gif

Referencing Other Data

   This specification covers how a receiver learns about URIs received
   only over a TV broadcast stream.  Receivers may use other URI schemes

as they see fit.  For example:

- The "http:", "ftp:", and similar schemes can be used to access
content from the Internet (given such a connection).

- The "file:" scheme may be used to access local information.

- Other TV broadcast-related schemes may coexist with this scheme
(e.g., "dvb:" and "davic:").  Applications that use such schemes
limit their scope of operation to those systems that implement such
shemes.

Security Considerations

This specification does not address security.  It assumes that
security and access control are handled by policies and procedures
implemented in the systems themselves.

While this specification appears to provide a level of security by
virtue of the fact that the only resources accessible by an
application are those named in the broadcast stream, such is not the
case.  Absent other policies and procedures, an ill-behaved
application can access resources by using device-specific mechanisms.

References

[1] ten Kate, Warner; Thomas, Gomer; Finseth, Craig, "TV Broadcast URI
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    This document expires 31 October 1999.