                 Exceptions to the 64-bit Boundary in IPv6 Addressing
                      draft-farmer-6man-exceptions-64-00

Abstract

   This document clarifies exceptions to the 64-bit boundary in IPv6
   addressing. The exceptions include, unicast IPv6 addresses with the
   first three bits 000, manually configured addresses, DHCPv6 assigned
   addresses, IPv6 on-link determination, and the possibility of an
   exception specified in separate IPv6 link-type specific documents.
   Further, operational guidance is provided and Appendix A. discusses
   the valid options for configuring IPv6 subnets

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1. Introduction

The 64-bit boundary in IPv6 addressing provides the basis for unicast
addresses to be autonomously generated using stateless address auto-
configuration (SLAAC) RFC 4862 [RFC4862]. SLAAC allows hosts to
connect to link networks without any pre-configuration, which is
especially useful for general-purpose hosts and mobile devices. In
this circumstance, unicast addresses have an internal structure
composed of 64-bit interface identifiers (IIDs) and therefore 64-bit
subnet prefixes, as defined in the IPv6 Addressing Architecture
[RFC4291bis]. For additional discussion of the 64-bit boundary in
IPv6 addressing see RFC 7421 [RFC7421].

However, in other circumstances, such as with manually configured
addresses or DHCPv6 [RFC3315] assigned addresses, unicast addresses
are considered to have no internal structure and are assigned to
interfaces on hosts as opaque 128-bit quantities without any
knowledge of the subnets present on the link network. The idea that
unicast addresses may have no internal structure is also defined in
IPv6 Addressing Architecture [RFC4291bis], "a node may consider that
unicast addresses (including its own) have no internal structure."

Further, unlike IPv4 where there is a single subnet mask parameter
with the two aspects of a subnet, address assignment and on-link
determination, tightly coupled together. In IPv6, these two aspects

are split into two logically separate parameters serving the two
aspects independently. The subnet assignment prefix is used by SLAAC
to perform autonomous address assignment. Separately, the on-link
prefix is used to determine if an address can be delivered using a
directly connected link network. IPv6 Neighbor Discovery (ND)
[RFC4861], the IPv6 subnet model [RFC5942], SLAAC [RFC4862] describe
and specify the use of these parameters in detail.

Briefly, unicast addresses assigned to interfaces on hosts are not
considered on-link unless covered by an on-link prefix advertised
through ND Router Advertisement (RA) messages containing Prefix
Information Options (PIOs) with the on-link (L) flag set or by manual
configuration. Whereas autonomous address assignment uses subnet
assignment prefixes that are also advertised through the same ND RA
messages and PIOs but with the autonomous (A) flag set instead.
While they act independently, most frequently subnets are defined by
identical subnet assignment prefixes and on-link prefixes, see
Appendix A. for a further decision of this and the other valid
options for configuring IPv6 subnets. However, unlike subnet
assignment prefixes, which are effectively required to be 64-bits in
length, on-link prefixes may have any length between 0 and 128 bits,
inclusive. Nevertheless, for consistency with the 64-bit boundary,
64-bit on-link prefix lengths are recommended in most circumstances.

Reinforcing the ideas that on-link prefixes are logically separate
and may have any length. On-link prefixes are part of the next-hop
determination process in IPv6 ND, which is intrinsically part of
routing and forwarding within IPv6, and BCP 198 [RFC7608] says,
"forwarding processes MUST be designed to process prefixes of any
length up to /128, by increments of 1."

Finally, SLAAC is currently designed to utilize a single IID length
to validate the length of the subnet assignment prefixes provided to
it. However, SLAAC itself does not define the IID length or assume
it is 64-bits in length. It utilizes the IID length defined in
separate link-type specific documents that are intended to be
consistent with the standard 64-bit IID length defined in the IPv6
Addressing Architecture [RFC4291bis]. While this is a possible
exception to the 64-bit boundary, currently there are no IPv6 link-
type specific documents that specify an IID length other than
64-bits. Effectively requiring 64-bit IIDs, and therefore 64-bit
subnet assignment prefixes when use with autonomous address
assignment, as performed by SLAAC.

In summary, the essential theory of this document is that the two
parameters that define IPv6 subnets, the subnet assignment prefix and
the on-link prefix, interact with the 64-bit boundary in subtle but
complex ways. Subnet assignment prefixes are the primary parameter

used to configure subnets, and when used they are effectively
required to be 64-bit in length. However, this does not indicate on-
link prefixes are also required to be 64-bits in length. Even when
SLAAC is used, and subnets are required to be 64-bits in length, on-
link prefixes shorter than 64-bits still seem to be valid. Further,
when subnet assignment prefixes are not used to configure subnets,
autonomous address assignment is not performed, and either manually
configured addresses or DHCPv6 assigned addresses must be used. In
this circumstance, subnets are configured solely using on-link
prefixes and therefore may have any length between 0 and 128 bits,
inclusive. Nevertheless, for consistency with the 64-bit boundary,
64-bit on-link prefix lengths are recommended in most circumstances.
Therefore, when subnets are solely configured using on-link prefixes,
subnets are only recommended to be 64-bit in length and are not
required to be such.

Some have stated, "IPv6 subnets are required to be 64-bits in
length." Whereas others counter, "IPv6 subnets are only recommended
to be 64-bits in length." However, because of the subtle but complex
interaction described above, both of these statements are not
entirely correct based on the details of how individual subnets are
configured. A more accurate statement is, "when configured using
subnet assignment prefixes, IPv6 subnets are required to be 64-bits
in length. Otherwise, when configured solely using on-link prefixes,
IPv6 subnets are only recommended to be 64-bits in length." Also, it
could be said, "standard IPv6 subnets are 64-bits in length," given
the 64-bit length is both required or recommended based on the
details of how individual subnets are configured. These last two
statements seem to more accurately reflect how the protocols that
define and implement IPv6 subnets operate. It is hoped that
clarifying the following exceptions to the 64-bit boundary and
providing clear operational guidance will provide a better
understanding of and more clarity to the subtle but complex
interaction between the 64-bit boundary in IPv6 addressing and how
IPv6 subnets are defined and implemented.

1.1. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
"SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and
"OPTIONAL" in this document are to be interpreted as described in BCP
14 [RFC2119] [RFC8174] when, and only when, they appear in all
capitals, as shown here.

2. Exceptions to the 64-bit Boundary

2.1. Unicast Addresses with the First Three Bits 000

   These are all currently special-purpose IPv6 addresses or are
   otherwise reserved. Also, they generally not assigned to interfaces
   on hosts, especially not to general-purpose hosts. Examples of these
   addresses are the unspecified address, the loopback address, and the
   IPv4-Mapped IPv6 Address from [RFC4291bis] sections 2.4.2, 2.4.3, and
   2.4.5.2 respectively.

   Most of these addresses have no internal structure and are considered
   opaque 128-bit quantities. However, some of these addresses could be
   presumed to have structure, such as the IPv4-mapped IPv6 address.
   This structure comes from embedding an IPv4 address within an IPv6
   address, but this structure is unrelated to and different from the
   internal structure, composed of standard IIDs and subnet prefixes,
   which makes up the 64-bit boundary.

   Historically, reservations were also made in this range for the
   mapping of OSI NSAP and IPX address into IPv6 addresses. They had
   structures similar to the IPv4-mapped IPv6 address discussed above.
   However, they have since been deprecated.

      Note: ever since RFC 2373 [RFC2373] addresses with the first three
      bits 000 have been an exception to the 64-bit boundary, and
      addresses with the first three bits 001 through 111, except for
      multicast addresses, have been expected to be consistent with the
      standard 64-bit IID length.

2.2. Manually Configured Addresses

   IPv6 addresses manually configured on a node's interface, sometimes
   known as statically configured, are an exception to the 64-bit
   boundary as they have no internal structure, are considered opaque
   128-bit quantities, and are assigned to node interfaces without any
   knowledge of the subnets present on the link network.

   Manually configured addresses MAY also include an associated an on-
   link prefix length. This on-link prefix length (n) MAY have any
   value between 0 and 128 bits, inclusive. If an on-link prefix length
   is included, the most significant, or leftmost, n-bits of the
   manually configured address are considered the on-link prefix.
   Alternatively, if an on-link prefix length is not included, the
   manually configured address MUST NOT automatically be considered on-
   link. Nevertheless, for consistency with the 64-bit boundary, 64-bit
   on-link prefix lengths are recommended in most circumstances. See

section 3 for detailed operational guidance regarding on-link prefix
lengths.

2.3. DHCPv6 Assigned Addresses

IPv6 addresses assigned to a host's interface via DHCPv6 [RFC3315]
(Identity Association for Non-temporary Addresses (IA_NA) or Identity
Association for Temporary Addresses (IN_TA)) are an exception to the
64-bit boundary as they have no internal structure, are considered
opaque 128-bit quantities, and are assigned to host interfaces
without any knowledge of the subnets present on the link network.
Further, DHCPv6 assigned addresses MUST NOT automatically be
considered on-link.

2.4. IPv6 On-link Determination

IPv6 on-link determination is an exception to the 64-bit boundary, in
that IPv6 ND [RFC4861] does not require on-link prefixes to be
64-bits in length. To the contrary, on-link prefixes MAY have any
length between 0 and 128 bits, inclusive. See section 3 for detailed
operational guidance regarding the use of on-link prefix lengths.

2.5. IPv6 Link-type Specific Documents

Separate IPv6 link-type specific documents, sometimes known as "IPv6-
over-FOO" documents, specify the IID length utilized by SLAAC to
validate the length of subnet assignment prefixes provided. The IID
length defined should be consistent with the standard 64-bit IID
length specified in the IPv6 addressing architecture [RFC4291bis].
However, these documents MAY create an exception to the standard
64-bit IID length scoped to a specific link-type technology when
justified. Although currently, there are no IPv6 link-type specific
documents that specify an IID length other than 64-bits.

When an exception to the standard 64-bit IID is specified in a link-
type specific document, valid justification needs to be documented in
some detail.

Further, SLAAC is currently designed to validate against only a
single IID length per link-type technology. As a result, a link-type
technology that specifies a non-standard IID length cannot be
directly bridged with another link-type technology that specifies the
standard 64-bit IID length without creating confusion about the IID
length that is to be used for validation. Therefore, if this type of
direct bridging is allowed, then a mechanism to ensure there is no
confusion about which IID length SLAAC is to validate against needs
to be provided.

[3](#). **Operational Guidance**

   At a high-level, this document recommends the following principles
   for the configuration of IPv6 subnets. The configuration of subnet
   assignment prefixes is recommended, allowing hosts to use autonomous
   address assignment. With this configuration, subnet assignment
   prefixes are required to be 64-bits in length, requiring 64-bit
   subnets in this circumstance. Further, identical on-link prefixes
   are recommended, but on-link prefixes are required to be 64-bits or
   shorter. Otherwise, if subnet assignment prefixes are not
   configured, then hosts will have to use manually configured addresses
   or DHCPv6 assigned addresses and subnets are configured solely by on-
   link prefixes that are recommended to be 64-bits in length, only
   recommending 64-bit subnets in this circumstance. There are two
   exceptions to these principles, inter-router point-to-point links
   with 127-bit prefixes [[RFC6164](#)] and the possible future specification
   of link-type specific documents based on an IID length that is not
   64-bits.

   More specifically;

      Network operators SHOULD configure routers to advertise to each
      link network at least one subnet assignment prefix (a PIO with the
      A flag set). If a subnet assignment prefix is advertised, it MUST
      be 64-bits in length and an identical on-link prefix (a PIO with
      the L flag set) SHOULD also be advertised. If an on-link prefix
      is advertised and is covered by a subnet assignment prefix, the
      on-link prefix MUST NOT be longer than 64-bits in length. If the
      specification for the particular link-type is based on an IID
      length that is not 64-bits, then a length consistent with the
      specification for the particular link-type MUST be used in the
      previous requirements instead of 64-bits.

      Otherwise, if a subnet assignment prefix is not advertised,
      network operators SHOULD configure routers to advertise to each
      link network at least one on-link prefix (a PIO with the L flag
      set) that is 64-bits in length or provide the same manually
      configured on-link prefix to each host on the link network that is
      64-bits in length. If the specification for the particular link-
      type is based on an IID length that is not 64-bits, then a length
      consistent with the specification for the particular link-type
      SHOULD be used in the previous recommendations instead of 64-bits.

      Alternatively, network operators MAY configure point-to-point
      router links with 127-bit on-link prefixes and no subnet
      assignment prefix, see [RFC 6164](#) [[RFC6164](#)].

Appendix A. discusses in further detail the valid options for
configuring IPv6 subnets

4. Acknowledgments

This document was inspired by a series of discussions on the 6MAN and
the V6OPS working group mailing lists over a period of approximately
two years, including discussions around the following drafts; draft-
jinmei-6man-prefix-clarify [I-D.jinmei-6man-prefix-clarify], draft-
bourbaki-6man-classless-ipv6 [I-D.bourbaki-6man-classless-ipv6],
draft-jaeggli-v6ops-indefensible-nd
[I-D.jaeggli-v6ops-indefensible-nd]. All basically revolving around
the discussion of RFC 4291bis [RFC4291bis] and its advancement to
Internet Standard.

This document was produced using the xml2rfc tool [RFC2629].

5. IANA Considerations

This memo includes no request to IANA.

6. Security Considerations

This document clarifies exceptions to the 64-bit boundary in IPv6
addressing. These clarifications are not security related and
therefore are not expected to introduce any new security
considerations.

However, the use of longer on-link prefixes effectively allows the
uses of smaller subnets, making it more feasible to perform IPv6
address scans as discussed in RFC 7707 [RFC7707] and RFC 7721
[RFC7721]. On the other hand, the use of smaller subnets can be
effective mitigation for neighbor cache exhaustion issues as
discussed and RFC 6164 [RFC6164] and RFC 6583 [RFC6583]. The
relative weights applied in this trade-off will vary from situation
to situation.

7. References

7.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate
           Requirement Levels", BCP 14, RFC 2119,
           DOI 10.17487/RFC2119, March 1997,
           <https://www.rfc-editor.org/info/rfc2119>.

[RFC3315] Droms, R., Ed., Bound, J., Volz, B., Lemon, T., Perkins,
           C., and M. Carney, "Dynamic Host Configuration Protocol
           for IPv6 (DHCPv6)", RFC 3315, DOI 10.17487/RFC3315, July
           2003, <https://www.rfc-editor.org/info/rfc3315>.

[RFC4291bis]
           Hinden, R. and S. Deering, "IP Version 6 Addressing
           Architecture", draft-ietf-6man-rfc4291bis-09 (work in
           progress), July 2017,
           <https://tools.ietf.org/id/draft-ietf-6man-rfc4291bis>.

[RFC4861] Narten, T., Nordmark, E., Simpson, W., and H. Soliman,
           "Neighbor Discovery for IP version 6 (IPv6)", RFC 4861,
           DOI 10.17487/RFC4861, September 2007,
           <https://www.rfc-editor.org/info/rfc4861>.

[RFC4862] Thomson, S., Narten, T., and T. Jinmei, "IPv6 Stateless
           Address Autoconfiguration", RFC 4862,
           DOI 10.17487/RFC4862, September 2007,
           <https://www.rfc-editor.org/info/rfc4862>.

[RFC5942] Singh, H., Beebee, W., and E. Nordmark, "IPv6 Subnet
           Model: The Relationship between Links and Subnet
           Prefixes", RFC 5942, DOI 10.17487/RFC5942, July 2010,
           <https://www.rfc-editor.org/info/rfc5942>.

[RFC6164] Kohno, M., Nitzan, B., Bush, R., Matsuzaki, Y., Colitti,
           L., and T. Narten, "Using 127-Bit IPv6 Prefixes on Inter-
           Router Links", RFC 6164, DOI 10.17487/RFC6164, April 2011,
           <https://www.rfc-editor.org/info/rfc6164>.

[RFC7608] Boucadair, M., Petrescu, A., and F. Baker, "IPv6 Prefix
           Length Recommendation for Forwarding", BCP 198, RFC 7608,
           DOI 10.17487/RFC7608, July 2015,
           <https://www.rfc-editor.org/info/rfc7608>.

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC
           2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174,
           May 2017, <https://www.rfc-editor.org/info/rfc8174>.

7.2. Informative References

[I-D.bourbaki-6man-classless-ipv6]
           Bourbaki, N., "IPv6 is Classless", draft-bourbaki-6man-
           classless-ipv6-03 (work in progress), March 2018.

   [I-D.jaeggli-v6ops-indefensible-nd]
              Jaeggli, J., "Indefensible Neighbor Discovery", draft-
              jaeggli-v6ops-indefensible-nd-01 (work in progress), July
              2018.

   [I-D.jinmei-6man-prefix-clarify]
              Jinmei, T., "Clarifications on On-link and Subnet IPv6
              Prefixes", draft-jinmei-6man-prefix-clarify-00 (work in
              progress), March 2017.

   [RFC2373] Hinden, R. and S. Deering, "IP Version 6 Addressing
              Architecture", RFC 2373, DOI 10.17487/RFC2373, July 1998,
              <https://www.rfc-editor.org/info/rfc2373>.

   [RFC2629] Rose, M., "Writing I-Ds and RFCs using XML", RFC 2629,
              DOI 10.17487/RFC2629, June 1999,
              <https://www.rfc-editor.org/info/rfc2629>.

   [RFC6583] Gashinsky, I., Jaeggli, J., and W. Kumari, "Operational
              Neighbor Discovery Problems", RFC 6583,
              DOI 10.17487/RFC6583, March 2012,
              <https://www.rfc-editor.org/info/rfc6583>.

   [RFC7421] Carpenter, B., Ed., Chown, T., Gont, F., Jiang, S.,
              Petrescu, A., and A. Yourtchenko, "Analysis of the 64-bit
              Boundary in IPv6 Addressing", RFC 7421,
              DOI 10.17487/RFC7421, January 2015,
              <https://www.rfc-editor.org/info/rfc7421>.

   [RFC7707] Gont, F. and T. Chown, "Network Reconnaissance in IPv6
              Networks", RFC 7707, DOI 10.17487/RFC7707, March 2016,
              <https://www.rfc-editor.org/info/rfc7707>.

   [RFC7721] Cooper, A., Gont, F., and D. Thaler, "Security and Privacy
              Considerations for IPv6 Address Generation Mechanisms",
              RFC 7721, DOI 10.17487/RFC7721, March 2016,
              <https://www.rfc-editor.org/info/rfc7721>.

   [RFC8273] Brzozowski, J. and G. Van de Velde, "Unique IPv6 Prefix
              per Host", RFC 8273, DOI 10.17487/RFC8273, December 2017,
              <https://www.rfc-editor.org/info/rfc8273>.

Appendix A. Options for Configuring IPv6 Subnets

   As discussed in the Introduction, IPv6 subnets are defined by two
   separate parameters, acting independently, the subnet assignment
   prefix and the on-link prefix. It is possible to configure these
   parameters with several different relationships to each other. These

parameters are primarily advertised in ND RA messages by PIOs, with
the A and L flags designating the purpose of the PIO. However, on-
link prefixes may also be manually configured.

SLAAC [RFC4862], section 5.5.3 bullet d, validates subnet assignment
prefixes against the IID length specified in separate link-type
specific documents that are intended to be consistent with the
standard 64-bit IID length. Currently, there are no link-type
specific documents that specify a non-standard IID length. Therefore
subnet assignment prefixes are effectively required to be 64-bit in
length. Further, to simplify the following discussion the
possibility that a link-type specific document could specify a non-
standard IID length is ignored.

Whereas on-link prefixes have no such validation specified in IPv6 ND
[RFC4861], this is also confirmed in SLAAC, section 5.5.3 bullet d.
Therefore on-link prefixes are not required to be 64-bits in length;
they may have any length between 0 and 128 bits, inclusive.
Nevertheless, for consistency with the 64-bit boundary, 64-bit on-
link prefixes lengths are recommended, except for inter-router point-
to-point links with 127-bit prefixes.

The following are the valid options for configuring the two
parameters that define an IPv6 subnet;

1. Subnet assignment prefixes and identical on-link prefixes, or;

2. Subnet assignment prefixes and shorter covering on-link prefixes,
    or;

3. Only subnet assignment prefixes and no on-link prefixes or;

4. Only on-link prefixes and no subnet assignment prefixes

Options 1 through 3, all define subnet assignment prefixes,
designating the use of autonomous address assignment, performed by
SLAAC, and effectively requiring subnets that are 64-bits in length.

Option 1 is both the most frequently used and the only recommended
option, except for inter-router point-to-point links with 127-bit
prefixes, it has identical subnet assignment prefixes and on-link
prefixes of 64-bits in length. The 64-bit subnets used for
autonomous address assignment are considered to be on-link. This
option is particularly recommended for networks that are made
available to the general public or networks that intend to connect
general-purpose hosts or mobile devices.

Option 2 is not recommended, but is still valid; it has on-link prefixes shorter than 64-bits, between 0 and 63 bits, inclusive, but covering the subnet assignment prefixes included. The 64-bit subnets used for autonomous address assignment are considered on-link, along with other numerically adjacent subnets. However, these other numerically adjacent subnets are not used for autonomous address assignment unless additional separate 64-bit subnet assignment prefixes are also included.

Option 3 is not recommended, but is still valid; it has subnet assignment prefixes but no on-link prefixes. Therefore the 64-bit subnets used for autonomous address assignment are not considered on-link, and all traffic for the subnets, including host-to-host traffic, must be sent to a default router. See RFC 8273 [RFC8273] for an example of this option.

Option 4 is not recommended, but is still valid; it has on-link prefixes but no subnet assignment prefixes, and therefore manually configured addresses or DHCPv6 assigned addresses must be used. When DHCPv6 is used a DHCPv6 server, or DHCPv6 relay will also be needed on the link network. The on-link prefixes may have any length between 0 and 128 bits, inclusive. However, 64-bit on-link prefixes are recommended, except for inter-router point-to-point links with 127-bit prefixes. This option effectively results in subnets that are defined only by the on-link prefixes, and therefore the subnets may have any lengths, even though 64-bits is recommended.

Furthermore, Option 4 essentially allows for the use of subnets longer than 64-bits. While this violates the spirit of the 64-bit boundary, technically it is not a violation of the 64-bit boundary; manually configured addresses, DHCPv6 assigned addresses, and on-link determination are all exceptions to the 64-bit boundary defined in this document. Nevertheless, for consistency with the 64-bit boundary, 64-bit on-link prefix lengths are recommended, effectively recommending 64-bit subnets, except for inter-router point-to-point links with 127-bit prefixes.

There can be operationally valid reasons for configuring subnets longer than 64-bits, and when a subnet is solely configured by an on-link prefix, longer subnets are not prohibited. RFC 6164 [RFC6164] explicitly allows 127-bit prefixes for inter-router point-to-point links. Hence the explicit exceptions included for it. Additionally, RFC 6583 [RFC6583] discusses "sizing subnets to reflect the number of addresses actually in use" as an operational mitigation for neighbor cache exhaustion issues. RFC 7421 section 3 [RFC7421] discusses these issues in more detail. Nevertheless, address conservation by itself is never considered a valid reason for configuring subnets

longer than 64-bits. Accordingly, if a site needs additional
subnets, additional 64-bit subnets are expected to be provided.

   Note: some hosts do not provide a mechanism for manually
   configuring an address on an interface, and other hosts do not
   implement DHCPv6. Hosts that implement neither and only implement
   SLAAC do exist and do not function on networks configured based on
   Option 4.

It possible to simultaneously configure multiple different subnets,
associated with a single link network, each based on the same or
different options described above. For example, there could be two
different subnets based on Option 1 and one based on Option 4, all
associated the same link network.

Logically there is another option that could define a subnet, "subnet
assignment prefixes and longer covered on-link prefixes," but it does
not result in an operationally valid subnet. While SLAAC and ND
accept this configuration, it is particularly problematic and is
considered an invalid configuration by the detailed operational
guidance provided above. It would have on-link prefixes longer than
64-bits, between 65 and 128 bits, inclusive, that would be covered by
an included subnet assignment prefix. Its use would result in the
64-bit subnet used for autonomous address assignment being
inconsistently considered on-link for some address and not on-link
for other addresses within the same subnet. This inconsistency
creates a performance differential between addresses within the same
subnet, which is inefficient and difficult to troubleshoot.

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