Dot-base62x: A Compact Textual Representation of IPv6 Address

{Authors, Date & Location}

Dissertation Topic

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Issues with colon-hexadecimal

- Too long
  - Length increasing from a maximum 15 bytes of IPv4 address to max. 45 bytes of IPv6 address.
- Too many variants
  - Eight different forms of a single IPv6 address in colon-hexadecimal
- Colon-related problems
  - Colon (:) has special properties in different scenarios

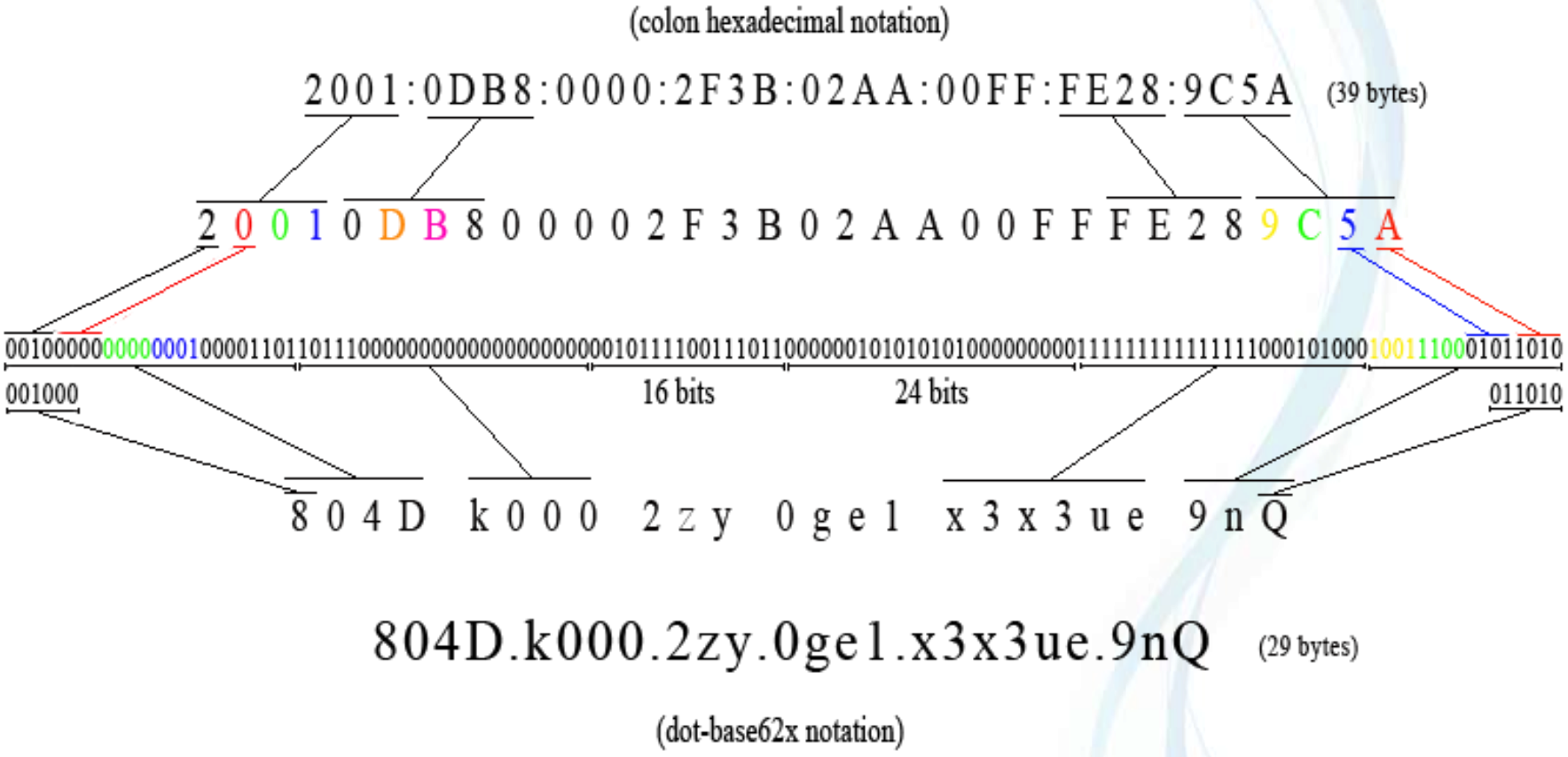
Efforts addressing those issues

- Methods to shorten the output
  - IETF RFC 1924, Base 85
  - Translucent implement in traditional Base 64
- Method to unify all variants
  - IETF RFC 5952
- Efforts to avoid conflict with colon (:)
  - One more square bracket is added in http_URL
  - Ipv6-literal.net for Windows UNC

Base62x

- Base62x is a piece of work in the field of base encodings, and it has a mission to solve some issues with conventional base 64 system.
- Base62x can be recognized as non-symbol version of traditional base 64.

Dot-base62x Notation of IPv6 Address 1



Dot-base62x Notation of IPv6 Address 2

- This scheme is named as ***dot-base62x notation*** of IPv6 address and has the following characteristics:
  - Encoded in Base62x
  - Dot-separated six segments
  - Prototype length: 22 bytes + 5 dots = 27 bytes
  - Character range: 0-9, A-Z, a-z
  - Case-sensitive

Dot-base62x Notation of IPv6 Address 3

- Process of converting an IPv6 address into dot-base62x:
  - Split the given16-byte address into 6 segments as
    - 3:3:2:3:3:2,
  - Converting each segment into Base62x,
  - Separate the Base62x encoded string into 4:4:3:4:4:3 as
    - xxxx.xxxx.xxx.xxxx.xxxx.xxx.

Advantages of Dot-base62x

- Advantages over colon-hexadecimal
  - *Shorter notation*
    - The length of IPv6 encoded in dot-base62x has a theoretical reduction of (39-27)/39= 30.77% to that in colon hexadecimal, i.e., from 39 to 27 in bytes.
  - *Compact shape, more human-friendly*
    - Six segments for IPv6
    - Two 3-digit segment
    - Dot (.) restored.

Benefits of Dot-base62x

- Benefits for the Whole IT Industry
  - *Compatible with IPv4 dot-decimal*
    - This point is obvious that keeping the identical separator in both versions of IP will maintain consistency in the whole Internet community.
  - *Minimized the number of variants*
    - Dot-base62x notation avoids this issue by introducing only one method to compress a given single IPv6 address, the identical method which has been used with IPv4.

Benefits of Dot-base62x -2

- Benefits for the Whole IT Industry
  - *Compatible with Microsoft UNC*
    - The same problem arises with Windows UNC due to the transition from dot-separated forms to colon-separated forms. Dot-base62x will avoid this conflict.
  - *Compatible with exist http_URL*
    - Dot-base62x has no such problem, by abandoning colon in its output form and instead using the “dot” as in IPv4, a greater degree of compatibility is maintained
  - and, others…

Summary

- Current colon-hexadecimal notation of IPv6 needs further improvement due to some issues involving with text representation.
- Dot-base62x deserves a debate over the notation of IPv6 address.
- There are some advantages and benefits from dot-base62x for the whole IT industry for many years to come.

Thank you!

- Questions?
  - Wadelau@ufqi.com