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**Let 'localhost' be localhost.**  
**draft-west-let-localhost-be-localhost-03**

Abstract

This document updates [RFC6761](#) by requiring that the domain "localhost." and any names falling within ".localhost." resolve to loopback addresses. This would allow other specifications to join regular users in drawing the common-sense conclusions that "localhost" means "localhost", and doesn't resolve to somewhere else on the network.

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## [1.](#) Introduction

[Section 6.3 of \[RFC6761\]](#) invites developers to "assume that IPv4 and IPv6 address queries for localhost names will always resolve to the respective IP loopback address". That suggestion, unfortunately, doesn't match reality. Client software is empowered to send localhost names to DNS resolvers, and resolvers are empowered to return unexpected results in various cases. This has several impacts.

One of the clearest is that the [\[SECURE-CONTEXTS\]](#) specification declines to treat "localhost" as "secure enough", as it might not actually be the "localhost" that developers are expecting. This exclusion has (rightly) surprised some developers.

Following on from that, the lack of confidence that "localhost" actually resolves to the loopback interface may encourage application developers to hard-code IP addresses, which causes problems in the transition from IPv4 to IPv6 (see problem 8 in [\[draft-ietf-sunset4-gapanalysis\]](#)). [\[SECURE-CONTEXTS\]](#) excluding "localhost" would exacerbate this risk, giving developers positive encouragement to use the loopback address rather than a localhost name.

This document suggests that we should resolve the confusion by requiring that DNS resolution work the way that users expect: "localhost" is the loopback interface on the local host. Resolver APIs will resolve "localhost." and any names falling within ".localhost." to loopback addresses [\[RFC5735\]](#)

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## 2. Terminology and notation

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 [\[RFC2119\]](#).

IPv4 loopback addresses are defined in [Section 2.1 of \[RFC5735\]](#) as "127.0.0.0/8".

IPv6 loopback addresses are defined in [Section 3 of \[RFC5156\]](#) as "::1/128".

## 3. Recommendations

This document updates [Section 6.3 of \[RFC6761\]](#) in the following ways:

1. Item #3 is changed to read as follows:

Name resolution APIs and libraries MUST recognize localhost names as special, and MUST always return an IP loopback address for address queries and negative responses for all other query types. Name resolution APIs MUST NOT send queries for localhost names to their configured caching DNS server(s).

Note that any loopback address is acceptable:  
"subdomain.localhost" could resolve to "127.0.0.1", "127.0.0.2", "127.127.127.127", etc.

2. Item #4 is changed to read as follows:

Caching DNS servers MUST recognize localhost names as special, and MUST NOT attempt to look up NS records for them, or otherwise query authoritative DNS servers in an attempt to resolve localhost names. Instead, caching DNS servers MUST generate an immediate negative response.

3. Item #5 is changed to replace "SHOULD" with "MUST":

Authoritative DNS servers MUST recognize localhost names as special and handle them as described above for caching DNS servers.

4. Item #7 is changed to remove "probably" from the last sentence:

DNS Registries/Registrars MUST NOT grant requests to register localhost names in the normal way to any person or entity. Localhost names are defined by protocol specification and fall outside the set of names available for allocation by registries/

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registrars. Attempting to allocate a localhost name as if it were a normal DNS domain name will not work as desired, for reasons 2, 3, 4, and 5 above.

5. Item #8 is added to the list, reading as follows:

Name resolution APIs, libraries, and application software MUST NOT use a searchlist to resolve the name "localhost". That is, even if DHCP's domain search option [RFC3397] is used to specify a searchlist of "example.com" for a given network, the name "localhost" will not be resolved as "localhost.example.com".

## **4. Implementation Considerations**

### **4.1. Non-DNS usage of localhost names**

Some application software like MySQL differentiate between the hostname "localhost" and the IP address "127.0.0.1", using a unix domain socket for the former, and a TCP connection to the loopback address for the latter. The constraints on name resolution APIs above do not preclude this kind of differentiation.

## **5. References**

### **5.1. 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, <<http://www.rfc-editor.org/info/rfc2119>>.
- [RFC5156] Blanchet, M., "Special-Use IPv6 Addresses", [RFC 5156](#), DOI 10.17487/RFC5156, April 2008, <<http://www.rfc-editor.org/info/rfc5156>>.
- [RFC5735] Cotton, M. and L. Vegoda, "Special Use IPv4 Addresses", [RFC 5735](#), DOI 10.17487/RFC5735, January 2010, <<http://www.rfc-editor.org/info/rfc5735>>.
- [RFC6761] Cheshire, S. and M. Krochmal, "Special-Use Domain Names", [RFC 6761](#), DOI 10.17487/RFC6761, February 2013, <<http://www.rfc-editor.org/info/rfc6761>>.

### **5.2. Informative References**



[[draft-ietf-sunset4-gapanalysis](#)]

Perreault, S., Tsou, T., Zhou, C., and P. Fan, "Gap Analysis for IPv4 Sunset", n.d.,  
<<http://tools.ietf.org/html/draft-ietf-sunset4-gapanalysis>>.

[RFC3397] Aboba, B. and S. Cheshire, "Dynamic Host Configuration Protocol (DHCP) Domain Search Option", [RFC 3397](#), DOI 10.17487/RFC3397, November 2002,  
<<http://www.rfc-editor.org/info/rfc3397>>.

[SECURE-CONTEXTS]

West, M., "Secure Contexts", n.d.,  
<<http://w3c.github.io/webappsec-secure-contexts/>>.

## **[Appendix A](#). Acknowledgements**

Ryan Sleevi and Emily Stark informed me about the strange state of localhost name resolution. Erik Nygren poked me to take another look at the set of decisions we made in [[SECURE-CONTEXTS](#)] around "localhost."; this document is the result, and his feedback has been very helpful.

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