IPv6 Socket API for Source Address Selection

draft-chakrabarti-ipv6-addrselect-api-01.txt

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Introduction

- Default Address Selection (RFC 3484) indicates usage of socket API in order to reverse the notion of default address selection mechanism- but no such socket API exists
- Per application or per socket tuning of source address selection seem to be useful for more control on the application behavior
- A new socket option is considered as a practical choice for many operating systems and implementations
- As opposed to bind() and IPV6_PKTINFO socket option, this API does not require the application to choose a source address – rather the system decides the preferred source address for the application following rest of the rules

Example Usages

- An application may use temporary source address for web browsing while another application may use “public” address for mail-server – “public” address is selected by default

- A mobility aware application would prefer to use its Care-Of-Address as source address for local packet exchanges – home address is selected by default

- An application on a CGA (Cryptographically Generated Address) enabled node, may want to choose between CGA source address or non-CGA source address

Socket Interface Changes

A new socket option IPV6_SRC_PREFERENCES

- Flags indicating preference are used as option values

Some of the defined flags:

IPV6_PREFER_SRC_COA   /* Prefer COA rather than HOA */
IPV6_PREFER_SRC_HOA   /* Prefer HOA */
IPV6_PREFER_SRC_TMP   /* Prefer temporary address */
IPV6_PREFER_SRC_PUBLIC   /* Prefer public source */
IPV6_PREFER_SRC_LARGESTSCOPE
IPV6_PREFER_SRC_LOWERSCOPE

Socket Interface Changes

- Flags indicate source address preference
- If a valid preferred source address is not available in the node, kernel chooses a suitable source address following address selection rules
- Setsockopt() and getsockopt() are used to set/get option values
- An application requiring a particular type of source address must validate the preferred source address in the system

Validation Function

- <netinet/in.h>

Boolean_t   inet6_is_addr(struct in6_addr *srcaddr, uint32_t flags);

- Application should pass the source address and preference flags
- Use this function after connect() , getsockname() sequence when source address is bound to the socket.

REQUIRE vs PREFERENCE

- Preference flags are used in ‘soft’ sense
- Preference socket option does not fail if the preferred source address is not a valid address in the system
- Applications which ‘REQUIREs’ a particular type of source address can use :

setsockopt(s, …, IPV6_SRC_PREFERENCES, …, …) + Validation

Change in nodename translation

- New AI_PREFER_SRC_* flags in <netdb.h>

Why change in getaddrinfo() for source address ?

- If setsockopt() is done for a type of preferred address, then setting corresponding AI_PREFER_SRC flags will ensure that getaddrinfo() is taking the source address preference into account in order to select the order of destination addresses

Open Issues

- Are the option flags adequate at this time ?

- Should we define a order of preference among the defined source preference flags combinations ?

  ex: If application wants PUB|COA, but the node only configures TMP|COA and PUB|HOA –then which one to prefer ?

- Does it make sense to have a more flexible validation function ? - which takes NULL srcaddress and a preference flag and returns TRUE or FALSE depneding on the preferred address availability?

  Issue : Unless the socket is connected, there is no guarantee that the preferred address would be valid for all data packet transfers

Open Issues

- Do these socket options have any use for AF_INET family sockets ?

- Does it make sense to have a separate getaddrinfoX() function for re-ordering of destination addresses according to the source preference flag ? This function should be called after getaddrinfo() .

  Advantage : Does not overload AI_* flags

  Issue: Potentially expensive; needs to redo the ordering checks and another pass of source-destination comparison

Next Step

- Will this draft be useful for being a working group item ?