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Sharing /64 3GPP Mobile Interface Subnet to a LAN
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Abstract

This document describes a known and implemented method of sharing a /64 IPv6 subnet from a User Equipment 3GPP radio interface to a tethered LAN.

Status of this Memo

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1. Introduction

3GPP mobile cellular networks such as GSM, UMTS, and LTE have architectural support for IPv6 [RFC6459], but only 3GPP Release-10 and onwards of the 3GPP specification supports DHCPv6 [RFC3633] for delegating IPv6 addresses to a tethered LAN. To facilitate the use of IPv6 in a tethered LAN prior to deployment of DHCPv6 in a 3GPP network, this document describes how the 3GPP User Equipment (UE) interface assigned /64 subnet may be shared from the 3GPP interface to a tethered LAN. This is achieved by specifying the UE 3GPP interface as an IPv6 /128 subnet taken from the 3GPP interface's network assigned /64 subnet. Then, assign the same address to the tethered LAN interface with the full /64 subnet. The /64 tethered LAN subnet will then be advertised to the tethered LAN via Router Advertisements (RA) [RFC4861].

The end result is that all UE interfaces have link-local IPv6 addresses, the UE's 3GPP interface has a /128 address from the 3GPP network assigned /64, and the same address that is assigned to the 3GPP interface is assigned to the tethered LAN interface with a /64 subnet and advertised to the LAN via RA. This approach only impacts the UE configuration and does not require any changes to the 3GPP network.

2. The Challenge of Providing IPv6 Addresses to a 3GPP Tethered LAN

As described in [RFC6459], 3GPP networks assign a /64 subnet to the UE with RA. IPv6 prefix delegation is a part of 3GPP Release-10 and is not covered by any earlier releases. Neighbor Discovery Proxy (ND Proxy) [RFC4389] functionality has been suggested as an option for sharing the assigned /64 from the 3GPP interface to the LAN, but ND Proxy is an experimental protocol and has some limitations with loop-avoidance.

DHCPv6 is the best way to assign subnets to tethered LANs. The method described in this document should only be applied when deploying DHCPv6 is not achievable in the 3GPP network.

3. Method for Sharing the 3GPP Interface /64 to the Tethered LAN

As [RFC6459] describes, the 3GPP network assigned /64 is completely dedicated to the UE and the gateway does not consume any of the /64 addresses. Communication between the UE and the gateway is only done using link-local addresses and the link is point-to-point. This allows for the UE to use the 3GPP network assigned /64 to assign itself a /128 subnet address to the 3GPP radio interface for consistent network reachability and the same address with a /64 subnet to the tethered LAN interface. The tethered LAN interface may then advertise the /64 subnet to the LAN with RA.

For example, if the 3GPP network assigns to the UE via RA the subnet 2001:db8:ac10:f002::/64, the UE may choose the address for its 3GPP interface to be 2001:db8:ac10:f002:1234:4567::9/128. When tethering a LAN, the UE may then assign that same address to its LAN interface with a /64 subnet, such as 2001:db8:ac10:f002:1234:4567::9/64. The UE may then advertise the 2001:db8:ac10:f002::/64 subnet to the tethered LAN using RA. Since the UE only consumes one address from the 3GPP network assigned /64 for both the 3GPP interface and the LAN interface, there is no address conflict potential. On the LAN, the /64 subnet is announced via RA and the interface address is defended with Duplicate Address Detection (DAD) [RFC4862]. Since the 3GPP interface is a point-to-point link and the gateway does not consume an address from the network assigned /64, there is no chance of address conflict on the 3GPP interface for the /64.

The UE should be compliant with the relevant requirements in [I-D.binet-v6ops-cellular-host-reqs-rfc3316update].

4. Security Considerations

Security considerations identified in [I-D.binet-v6ops-cellular-host-reqs-rfc3316update] are to be taken into account.

5. IANA Considerations

This document does not require any action from IANA.

6. Acknowledgments

Many thanks for review and discussion from Masanobu Kawashima, Teemu Savolainen, Mikael Abrahamsson, Eric Vyncke, and Ales Vizdal.

7. Informative References

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