IEEE P802.11  
Wireless LANs

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| Proxy ARP comment resolution | | | | |
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Abstract

This document provides resolution for CID#3209:



Discussion:

There are a few options how the AP could handle ARP announcements/unsolicited NAs:

1) AP forwards any ARP announcement/unsolicited NA it receives from STAs, to the BSS

2) AP generates and sends to the BSS ARP announcements/unsolicited NAs whenever it updates its mapping table. But it does not 'forward' the ARP announcement/unsolicited NAs received from STAs

2.1) the above address change announcements are sent to the BSS using the broadcast address

2.2) the above address change announcements are sent by the AP to the each associated STA using unicast

3)AP does not 'forward' any address change announcement it received from STAs to the BSS, nor it generates the announcements itself.

4) leave it unspecified, handling of address change announcements by the AP would become implementation specific. Note, a change to the current 802.11mc spec would still be desirable, as the current text is not consisitent between proxy-arp for ipv4 and ipv6.

Passpoint (see [1]) enforces AP behavior in line with option 3). The undesirable effect of this option is that a STA1 who wants to talk to STA2 within the BSS, would need to make an ARP Request to request the MAC address of STA2, as the ARP announcement is not sent out into the BSS. It worth noting, that even if the ARP announcements were sent out, STAs may be in sleep mode and not receive it, thus they would still need to make an ARP Request to learn the MAC address of another STA.

Option 1) opens the network to all sort of insider attacks (eg, ARP Cache poisoning, Session hijacking, etc.).

Option 2) is a new functionality to be implemented by the AP. Adding new functionality to a feature existing and deployed introduces interoperability issues.

Option 4) requires to add a sentence at the end of the second paragraph to describe that an ARP announcement received from a STA may be sent out into the BSS by the AP:

“*When an AP receives an ARP Announcement (IETF RFC 5227) from a STA currently associated to the BSS, the AP may update its Hardware to Internet Address mapping and may forward the ARP announcement to other STAs in the BSS*”, and revise the last sentence of the Proxy-ARP section:

“~~When MAC address mappings change, the AP may send unsolicited Neighbor Advertisement Messages on behalf of a STA.~~ *When an AP receives an Unsolicited Neighbor Advertisement message from a STA currently associated to the BSS, the AP may update its hardware to Internet Address mapping and may forward the Neighbor Advertisement to other STAs in the BSS.*”

With the above changes, the handling of ARP Announcements and unsolicited NAs is left to the AP. If the AP decides to forward the announcements into the BSS, it will need to deploy proprietary measures to protect the BSS from ARP cache poisoning and other attacks (the functionality becomes the same as option 1). If the AP decides to block the ARP announcements and unsolicited NAs, then it will become an option 3) functionality.

The below proposed edits reflect changes to align the Proxy-ARP functionality with option 3).

**TGmc Editor: modify section 10.24.14 as suggested below:**

**4.3.16.13 Proxy ARP**

The Proxy ARP capability enables an AP to indicate that the non-AP STA does not receive ARP frames from other non-AP STAs or from outside the BSS.

**10.24.14 Proxy ARP (including Proxy Neighbor Discovery) service**

Implementation of the Proxy ARP Service is optional for a WNM STA. A STA that implements the Proxy ARP Service has dot11ProxyARPImplemented set to true. When dot11ProxyARPImplemented is true, dot11WirelessManagementImplemented shall be true. When dot11ProxyARPActivated is true, the Proxy ARP Service bit in the Extended Capabilities field shall be set to 1 to indicate that the AP supports the Proxy ARP Service. When dot11ProxyARPActivated is false, the Proxy ARP Service bit shall be set to 0 to indicate that the AP does not support the Proxy ARP Service.

When the AP sets the Proxy ARP field to 1 in the Extended Capabilities element, the AP shall maintain a Hardware Address to Internet Address mapping for each associated station, and shall update the mapping when the Internet Address of the associated station changes. When the IPv4 address being resolved in the ARP request packet is used by a non-AP STA currently associated to the BSS, the Proxy ARP service shall respond on behalf of the STA to an ARP request (IETF RFC 925) or an ARP Probe (IETF RFC 5227).

When an AP receives an ARP Announcement (IETF RFC 5227) from a STA currently associated to the BSS, the AP may update its Hardware to Internet Address mapping and shall not forward the ARP announcement to other STAs in the BSS.

When an AP receives an ARP Request from one associated STA or from the DS with a Target IP Address that corresponds to a second associated STA, the AP shall insert the second STA MAC address as the Sender’s MAC Address in the ARP Response packet.

When an IPv6 address is being resolved, the Proxy Neighbor Discovery service shall respond with a Neighbor Advertisement message (Section 4.4, IETF RFC 4861) on behalf of an associated STA to an Internet Control Message Protocol version 6 (ICMPv6) Neighbor Solicitation message (Section 4.3, IETF RFC 4861).

When an AP receives an Unsolicited Neighbor Advertisement message from a STA currently associated to the BSS, the AP may update its hardware to Internet Address mapping and shall not forward the Neighbor Advertisement to other STAs in the BSS.

**References:**

[1] passpoint rel-2 link: <https://www.wi-fi.org/hotspot-20-release-2-technical-specification-package-v100>