P802.1CQ–
Proposed PALMA Description

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From minutes of TSN Call of 2019-10-21:

1. P802.1CQ Multicast and Local Address Assignment (https://1.ieee802.org/tsn/802-1cq/)
Including:
Manoj Nayak presented contribution to P802.1CQ: "Duplicate MAC Address Detection"
http://www.ieee802.org/1/files/public/docs2019/cq-nayak-DMAD-0919-v01.pdf
Disposition: further discussion needed

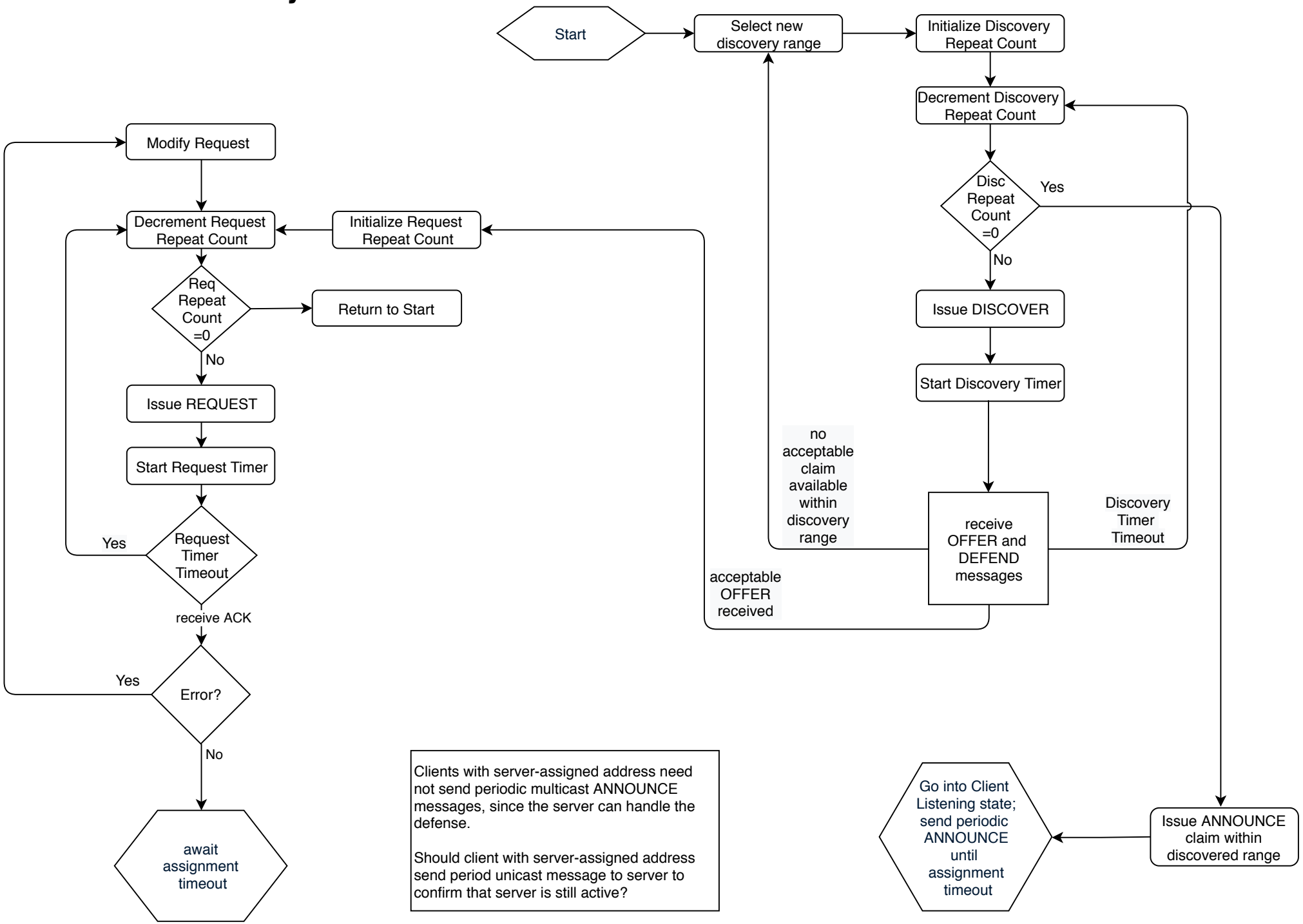
2. Roger Marks, the Editor presented Editor's Draft 0.3:
http://www.ieee802.org/1/files/private/cq-drafts/d0/802-1CQ-d0-3.pdf
Disposition: Draft will be further developed for TG ballot

3. Roger Marks presented contribution to P802.1CQ from Roger Marks and Antonio de la Oliva: "Converged PALMA Flowcharts - Initial Thoughts"
http://www.ieee802.org/1/files/public/docs2019/cq-Marks-Oliva-flowcharts-1019-v0.pdf
Disposition: further discussion needed

In this contribution:

- Updated PALMA flowcharts
- Proposed revision of subclause 5.2 (PALMA Summary) in Editor's Draft 0.3, primarily correcting editor's errors

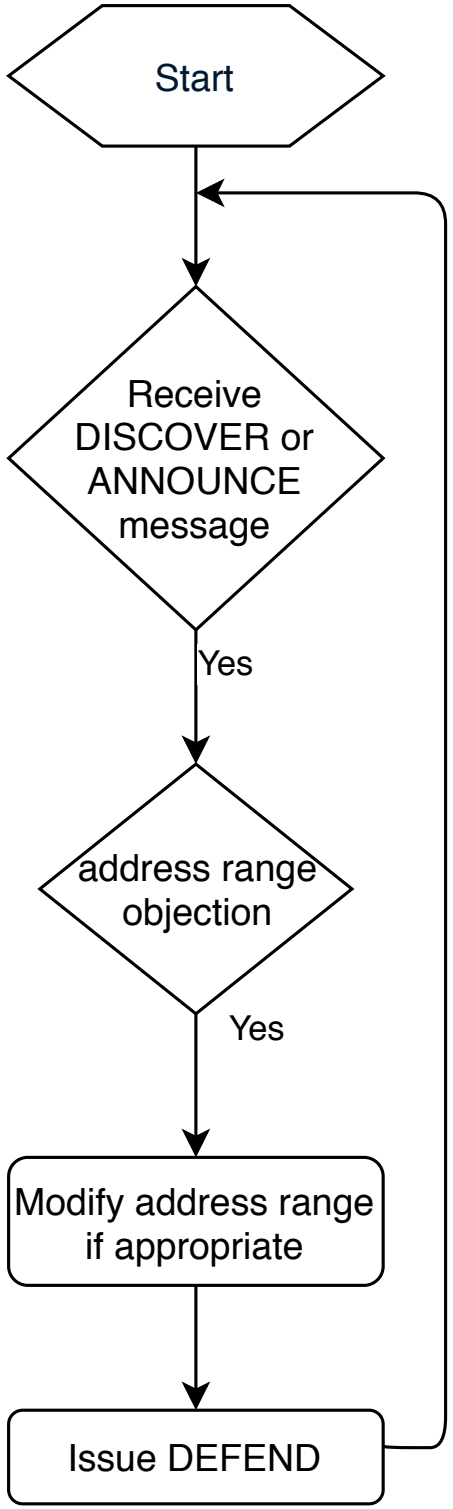
Client Discovery



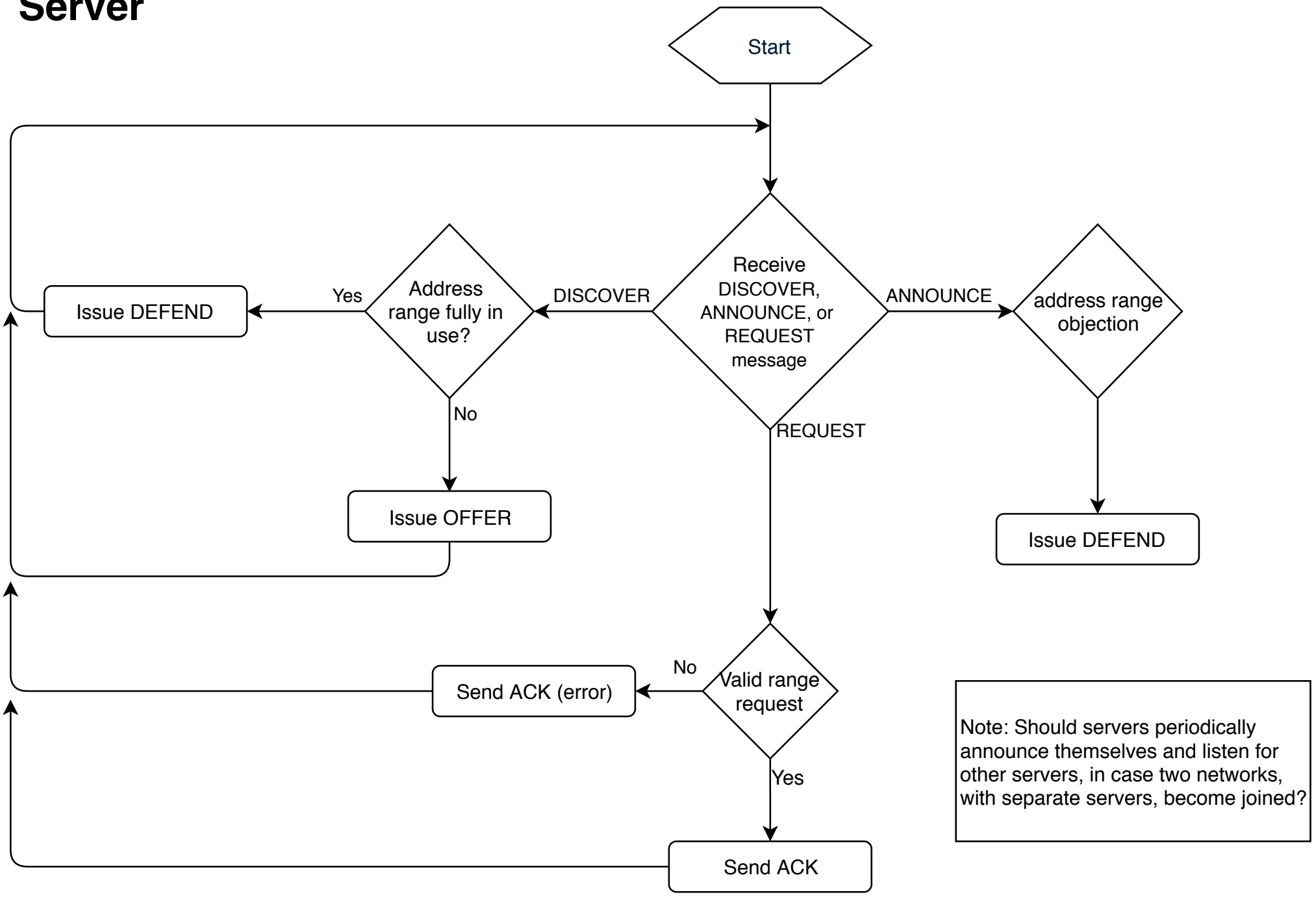
Client Listening State,

Self-assigned Client

Note: Clients with server-assigned addresses need not receive or respond to the multicast DISCOVER or ANNOUNCE messages, since the server can respond to them.



Server



Note: Should servers periodically announce themselves and listen for other servers, in case two networks, with separate servers, become joined?

5.2 PALMA

The Protocol for Assignment of Local and Multicast Addresses (PALMA) is specified herein. PALMA is specified as a single protocol supporting both server-specified allocation and serverless peer-to-peer claiming-based assignment. Both claiming-based and server-based PALMA handle the case in which the station lacks a valid MAC unicast address assignment prior to execution of the protocol.

The PALMA protocol is initiated by the PALMA client's transmission, from a source address selected ~~from~~within a specified range to a known multicast address, of a DISCOVER message, optionally specifying a request for a preferred local unicast or multicast MAC address range out of a pre-established set specified herein (specified in subclause <<TBD>>). The client need not know in advance whether PALMA servers or PALMA client peers ~~or~~are available on the LAN, but the DISCOVER message can be limited to stimulating responses from only servers or only client peers.

A PALMA server, listening for probe messages at the known multicast address, responds to the DISCOVER message with a unicast OFFER message, specifying the particular addresses available for assignment in accordance with the DISCOVER request. If this assignment is acceptable to the client, it responds with a ~~<<multicast?>>~~ REQUEST message to the server, which terminates the exchange with a ~~<<multicast?>>~~ ACKNOWLEDGE message.

A PALMA client ~~peer~~ that has been assigned an address from a PALMA server does not respond to a DISCOVER message, since the PALMA server can presumably respond on its behalf. However, a PALMA client that holds active self-assigned addresses ~~assignments previously allocated by a PALMA client peer~~ is required to listen to the known multicast address and respond to a DISCOVER message with a unicast DEFEND message if the request specifies addresses that the responding client has ~~been~~ previously self-allocated and wishes to retain, or in case it has been programmed by an administrator to defend against certain requests for administrative reasons, such as if the request is larger than the administrator allows.

After issuing the DISCOVER message, the client awaits OFFER and DEFEND messages. The DISCOVER is repeated a specified number of times after a specified waiting period. The client then adopts addresses from its claimed range, with the exception of those defended, and issues a multicast ANNOUNCE message specifying those addresses. The client then enters the DEFEND state, during which it listens for a DISCOVER requesting any of its adopted range of addresses while also issuing ANNOUNCE messages periodically. If the client, upon receipt of one or more DEFEND messages during the discovery period, discovers that its original request is too blocked for acceptable use, it may re-initiate a new DISCOVER message with a different address range. If, during the discovery period, the client receives, from a PALMA server, an OFFER that it considers acceptable, it responds with a REQUEST to inform the offering server, terminating the repetition of the DISCOVER message.

In the presence of a server, the PALMA ~~a~~ four-message (DISCOVER–OFFER–REQUEST–ACKNOWLEDGE) exchange is similar to that of DHCP.

In the absence of a server, PALMA takes a form similar that of MAAP. Using MAAP, a station can claim a multicast address range to be unique on the LAN. IEEE 1722 intends for MAAP-acquired addresses to be used to identify frames in time-sensitive streams, not for use as IEEE 802 MAC source or destination addresses. Nevertheless, the MAAP framework is well suited as the basis for assigning unicast IEEE 802 MAC addresses. Although IEEE 1722 identifies a specific block of multicast addresses for MAAP assignment, it does not limit MAAP operation to multicast addresses in general nor to the identified MAAP multicast address block in particular. MAAP presumes that the requesting station holds a valid MAC address, while PALMA covers the case in which the station lacks a valid MAC unicast address assignment prior to execution of the protocol. The PALMA message format is a significantly modified version of the MAAP message format.

<<Editor's note: Should the DISCOVER be restricted to claiming only a single unicast MAC address, or perhaps only up to a few of them, to avoid excessive claiming? For multicast addresses, perhaps larger blocks could be expected and enabled, as in MAAP.>>