The background features a dynamic, abstract composition of thick, flowing lines in shades of blue, green, yellow, and red. These lines curve and twist across the frame. Interspersed among these lines are various digital motifs, including binary code (0s and 1s) and stylized representations of data packets or network paths, all rendered in a glowing, semi-transparent style.

Link Layer Addresses Assignment Mechanism for DHCPv6

- IETF-104 (Prague)
- Wednesday, 27 March 2019

- Bernie Volz
- draft-bvtn-dhc-mac-assign

Last Edit: 2019-03-20 14:15 EDT (BV)

Background (1/3)

- RFC 7241 defines cooperation between IEEE 802 and IETF and there are periodic discussions
- IEEE 802c split “local” MAC address space into 4 quadrants to provide for different allocation schemes
- IEEE 802cq is working on defining allocation mechanisms
- Several from IETF leadership (Ralph Droms, Russ Housley, Suresh Krishnan) thought that DHCPv6 might be usable as a MAC address allocation (802cq) mechanism

Background (2/3)

- Ralph Droms (IETF) reached out to Bernie
- Tomek and Bernie discussed and decided to work on issue, published draft-bvtm-dhc-mac-assign
- More background about 802c/cq in Pat Thaler's “[Emerging IEEE 802 Work on MAC Addressing](#)” slides from IETF-96 (<https://datatracker.ietf.org/meeting/96/materials/slides-96-edu-ieee802work-0/>)
- Tomek and Bernie presented to IEEE RAN meeting in late May 2018
- Call for adoption to DHC WG failed (Jan 2019)

Background (3/3)

- IETF-IEEE 802 coordination call in February discussed work
 - While DHCPv6 link layer address assignment does not fulfill *all* requirements of P802.1CQ, it is a sound solution for some use cases, and P802.1CQ intends to adopt it

Use Cases for MAC addresses

- Hypervisor – to allocate the Virtual Machines
 - Lots of VMs
 - May have short or long life
 - May be possible to reuse addresses for different network segments based on data center
- IoT devices
 - Often short lived/disposable
 - Little need for global MAC address
- Individual clients

Why DHCPv6?

- Existing infrastructure: protocol, network, tools
- Servers already know how to manage and assign resources
- Protocol easily extensible
- We're in DHC WG ...



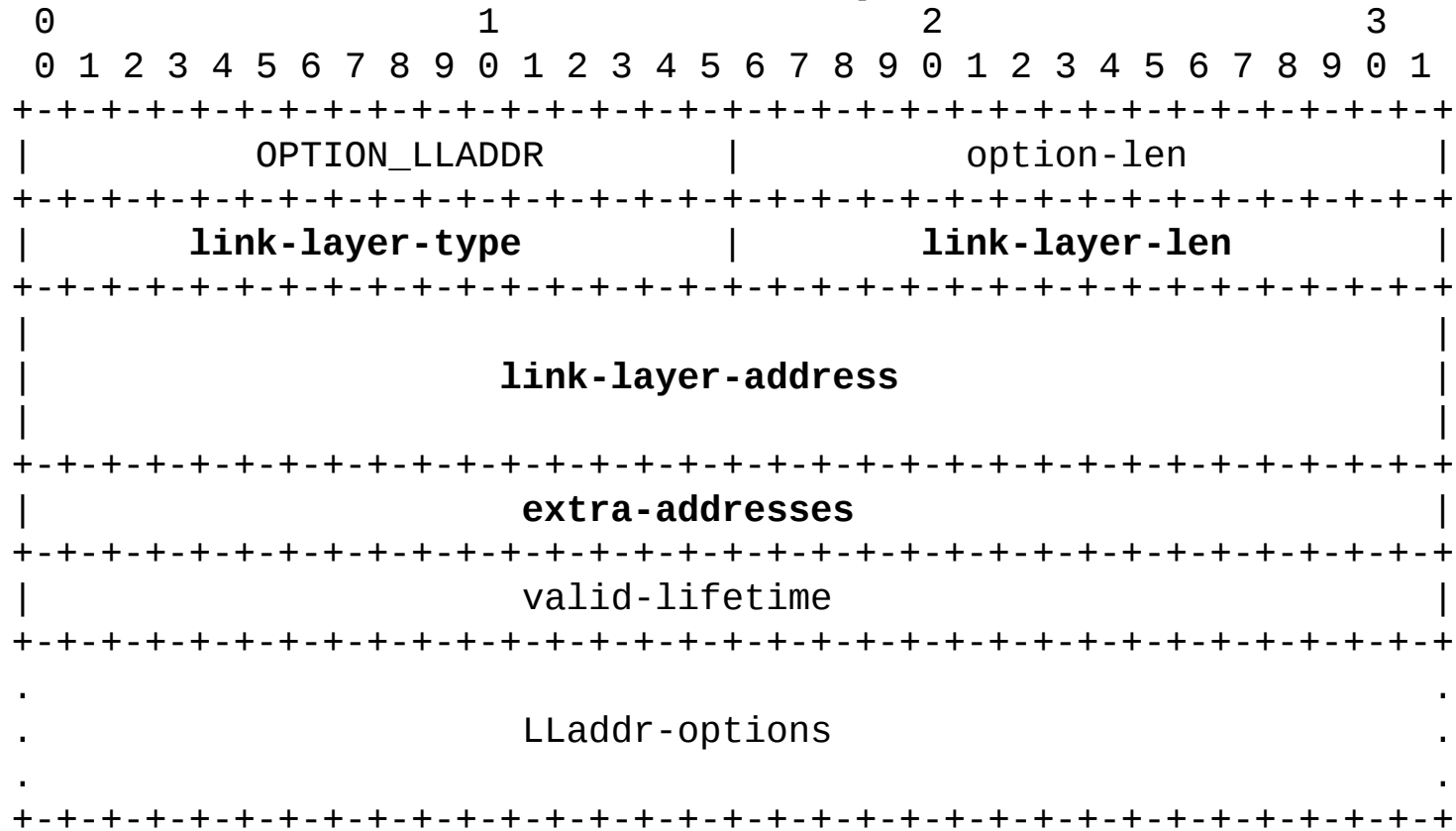
draft-bvtm-dhc-mac-assign

- Focused on Hypervisor use case where Hypervisor needs a block of MAC addresses to assign to VMs
- Can also be used by actual clients, but requires:
 - IPv6 support
 - A short-term temporary MAC address for link-local IPv6 address to request DHCPv6 assigned MAC address
 - Client should use a non-link-layer address for DUID (DUID-EN or DUID-UUID)

Defines 2 New DHCPv6 Options

- IA_LL (Identity Association for Link Layer Addresses) Option
 - Similar to IA_NA and IA_PD
 - Used as container option for requested / assigned link-layer addresses
- LLADDR (Link Layer Addresses) Option
 - Similar to IAADDR and IAPREFIX
 - Used to request/assign link-layer addresses

LLADDR Option



- Link-layer-type and link-layer-len specify requested link-layer address
- Link-layer-address specifies starting address requested or assigned
- Extra-address specifies number of additional addresses (0 for single address)
- Valid-lifetime lifetime of assignment (from “now” in seconds)
- LLaddr-options could contain future options specific to assignment

Client / Server Operation (1)

- DHCPv6 essentials the same as address / prefix delegation
- But a bit simpler overall
 - Confirm, Decline, and Information-Request client messages not used

Client / Server Operation (2)

- For hypervisor model
 - Hypervisor is client, but does not use resulting link-layer addresses
 - Hypervisor could obtain large blocks or one link-layer address per VM as needed
 - Hypervisor provides link-layer address to VMs
 - VMs could do standard DHCPv6 for IPv6 addresses/delegated prefixes or DHCPv4

Client / Server Operation (3)

- If end client (e.g. IoT) wants a link-layer address
 - Could use Temporary MAC address for anonymity (see <https://mentor.ieee.org/802.11/dcn/02/11-02-0109-00-000i-temporary-mac-address-for-anonymity.ppt>) to do DHCPv6 to get “long term” link-layer address assignment
 - Clarify client must not use DUID-LL/LLT based on temporary MAC
 - Client then uses assigned link-layer address for normal DHCPv6, DHCPv4, ...

Next Steps

- Is this work of interest to DHC?
 - Call for adoption failed in Jan 2019
 - IEEE would like to see work progress (intends to adopt for some use cases)
 - **Should we try for another call for adoption?**
- Provide feedback to authors about draft
- Carlos will discuss an extension to this work



Question or comments ...

&

THANKS