IPv6?

What is the use of NDP?

How does it work?

I can haz sekuritie?

Conclusion

Neighbor Discovery Protocol

Pierre-Marie de Rodat Stephane Sezer

July 8, 2011

Plan

1. IPv6?
   - Addresses
   - Multicast
   - ICMP
   - EUI64

IPv6?
Addresses
Multicast
ICMP
EUI64
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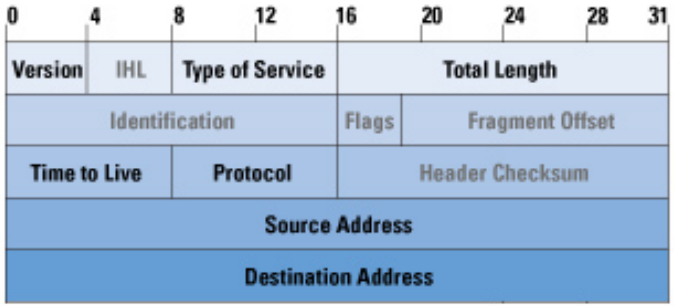
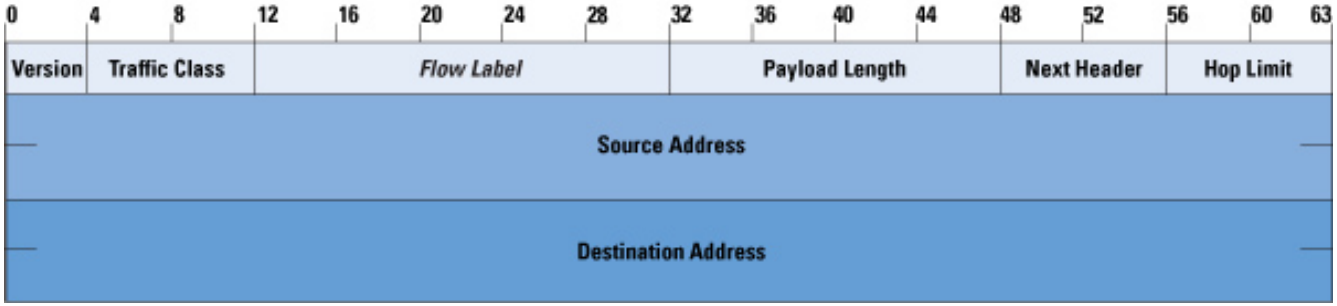
The Derridj slide §

IPv4 Header



IPv6 Header



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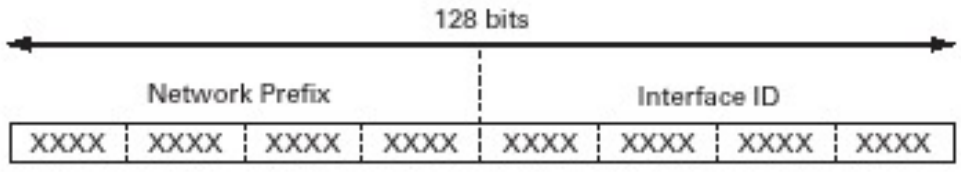
Address format

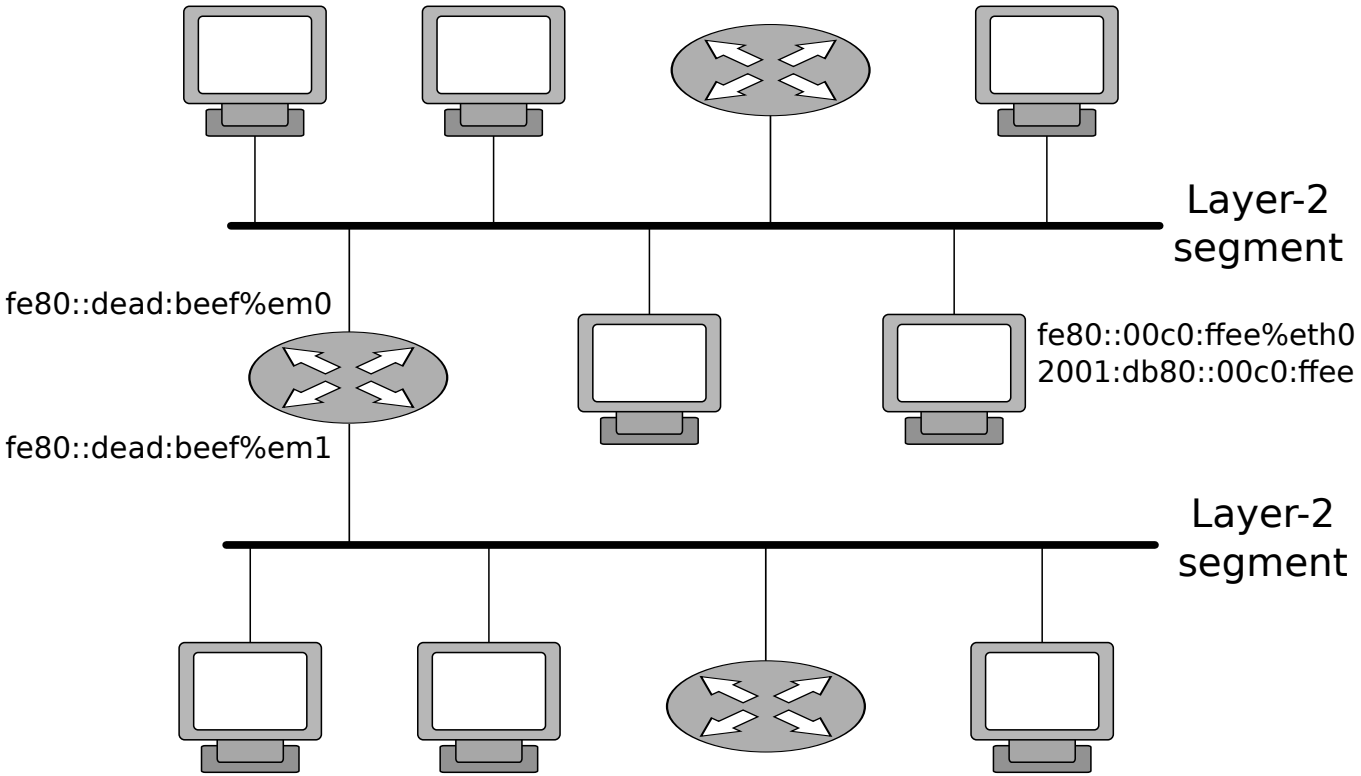


XXXX = 0000 through FFFF

3.4×10^{38} = ~340,282,366,920,938,463,374,607,432,768,211,456 IPv6 Addresses

Address scoping

- Each address is assigned to an interface
- Each address has a scope
- Examples: link local, site local, global. . .



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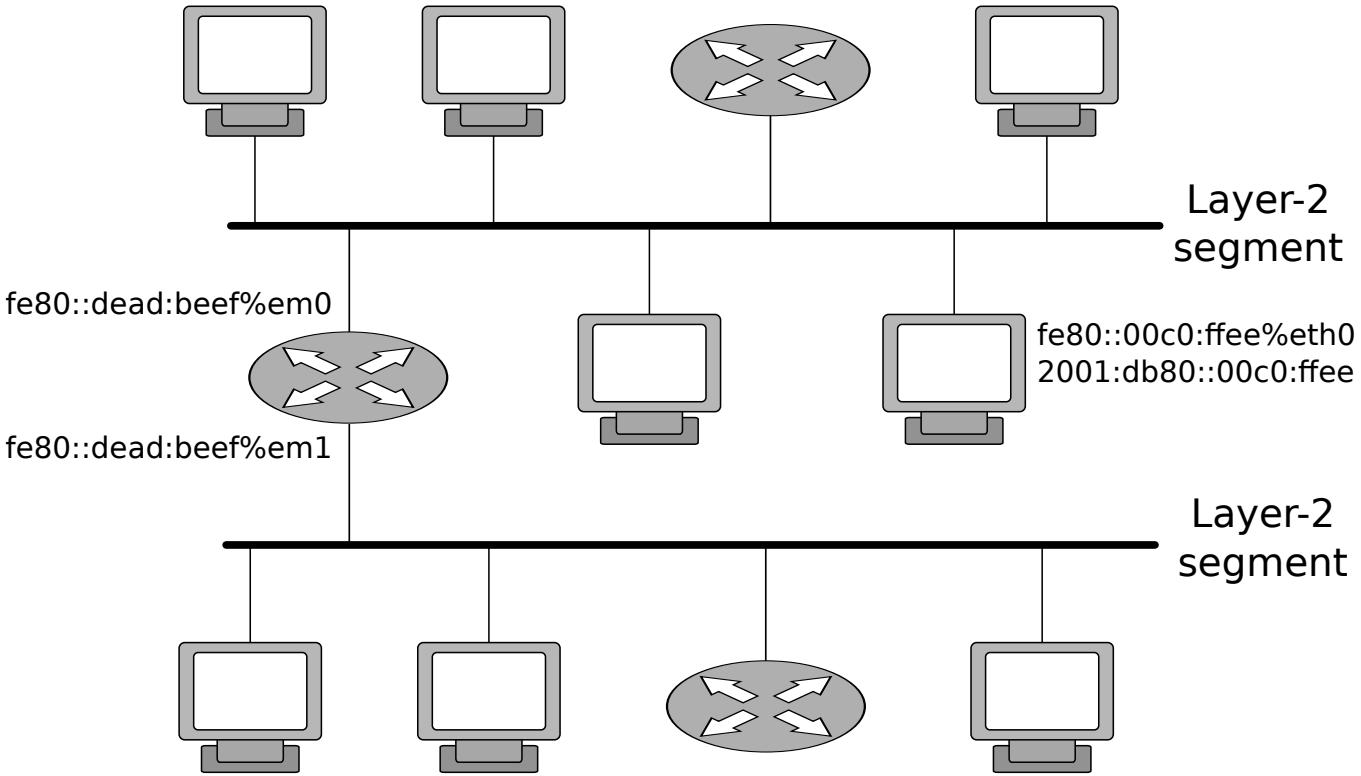

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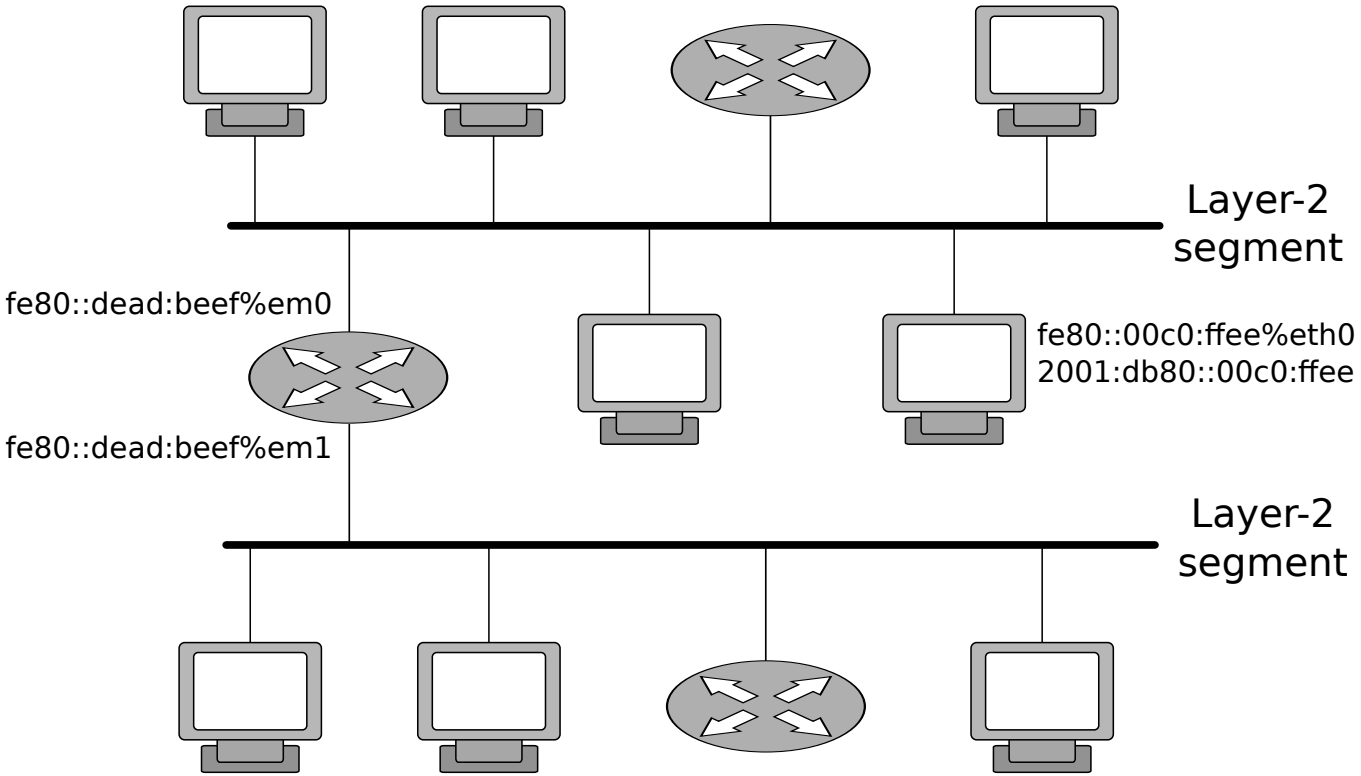

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What is multicast?

- Reach a group of machines
- No broadcast in IPv6

What is multicast?

- Reach a group of machines
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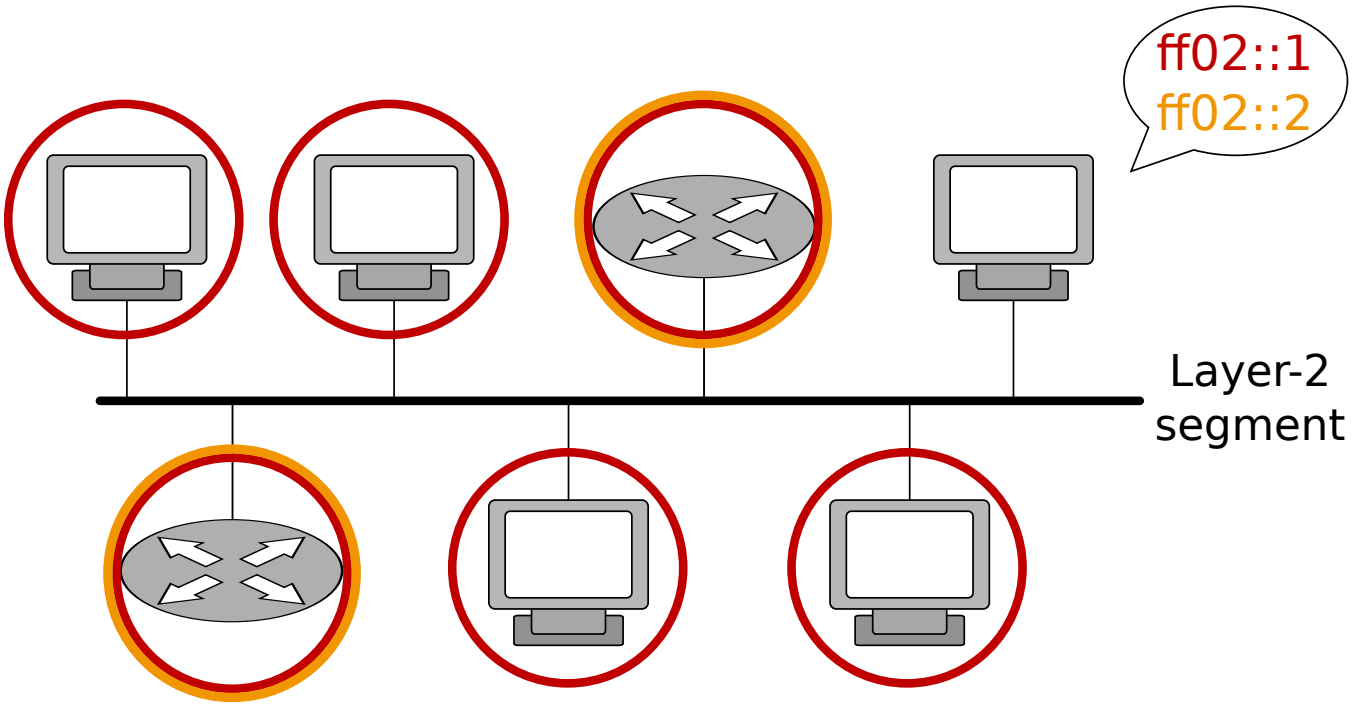
Multicast addresses on a local link

The ones we are interrested in. . .

- ff02::1 All nodes on the local network segment
- ff02::2 All routers on the local network segment



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- Addresses
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IPv6?
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What is it used for?

- ICMPv6 is an integral part of IPv6
- Used for error reporting, diagnostics, etc. . .
- NDP fits here

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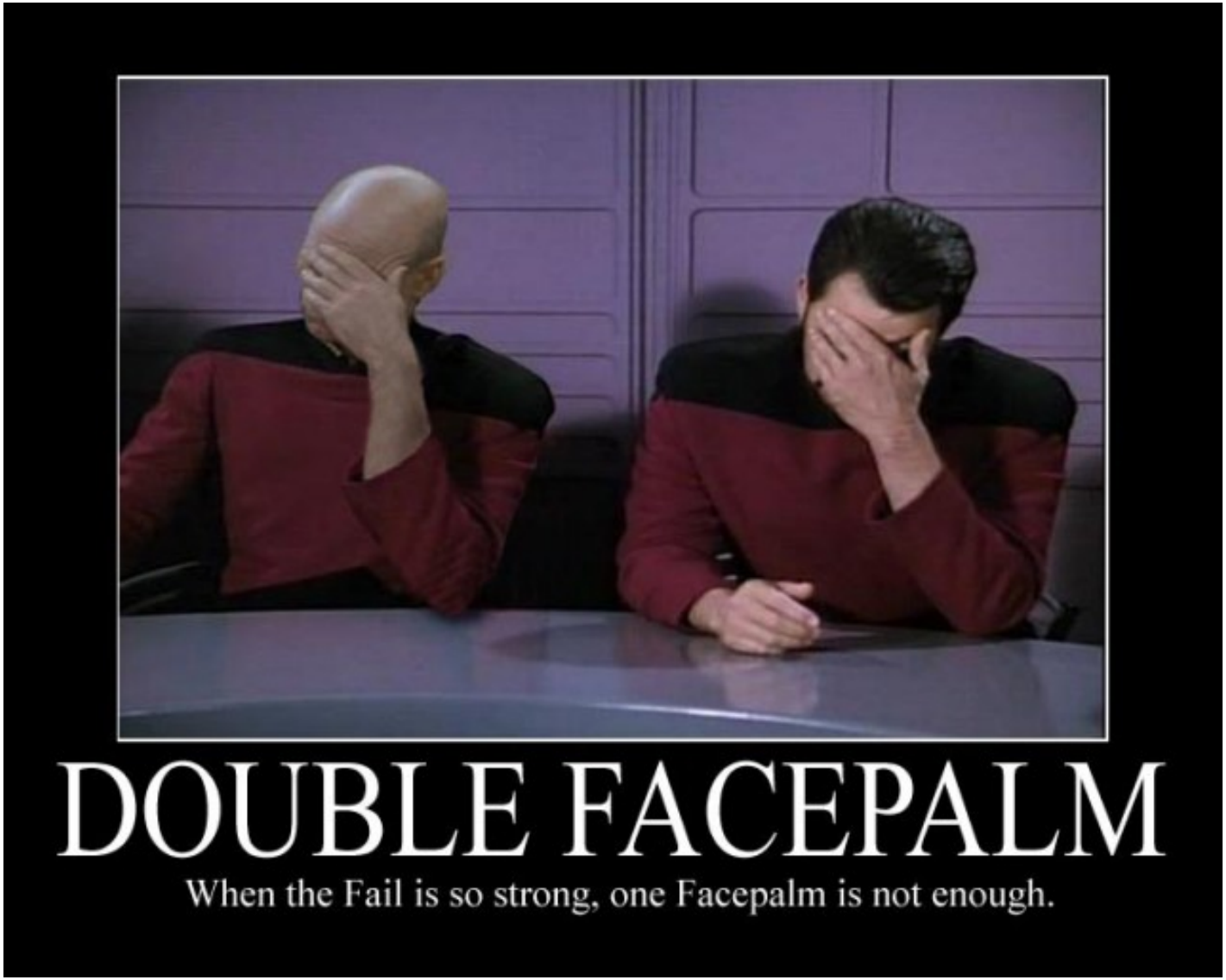
Idiots with firewalls. . .



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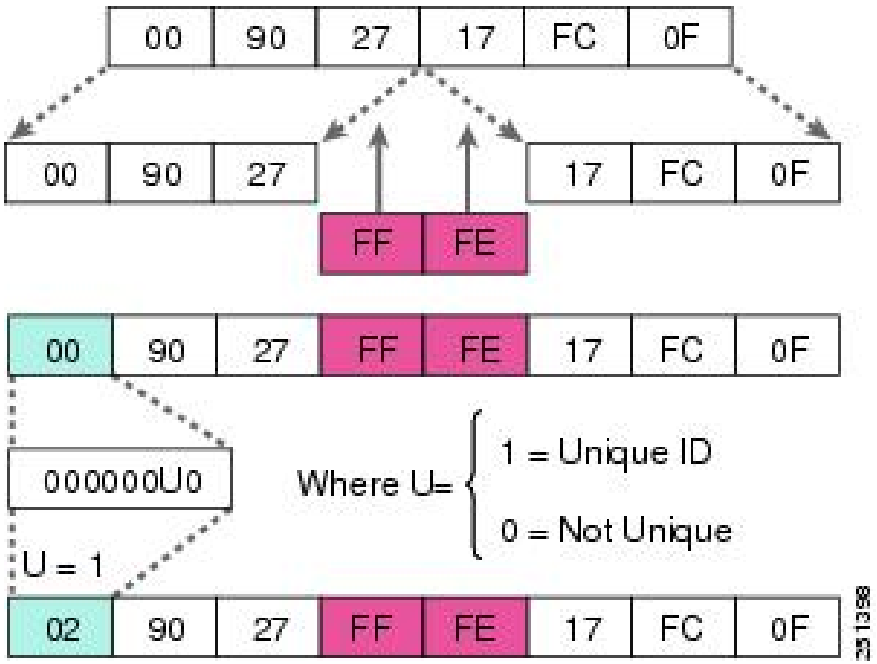
Suffix construction from MAC address



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2. What is the use of NDP?
   - Determination of the link-layer address of other nodes
   - Autoconfiguration of the address of nodes
   - DNS Configuration

IPv6?

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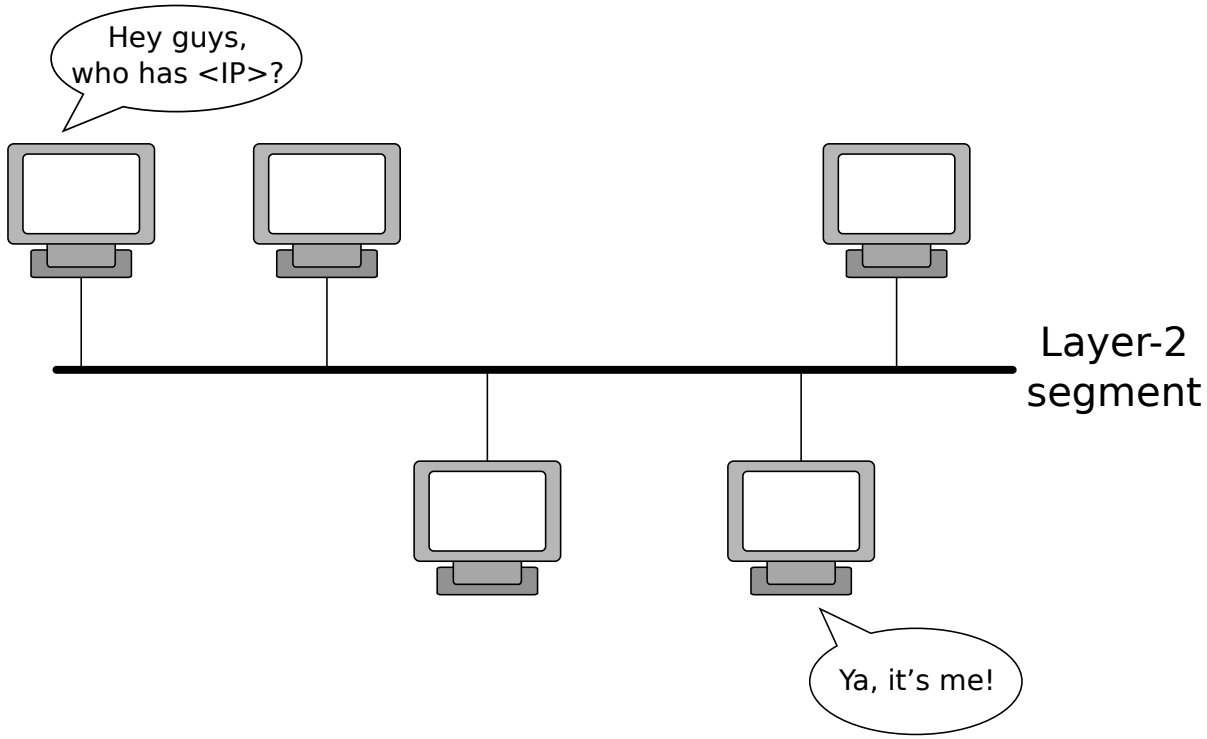
Layer 3 to layer 2

- When talking to a host on the same network
- Replaces ARP on an IPv6 network



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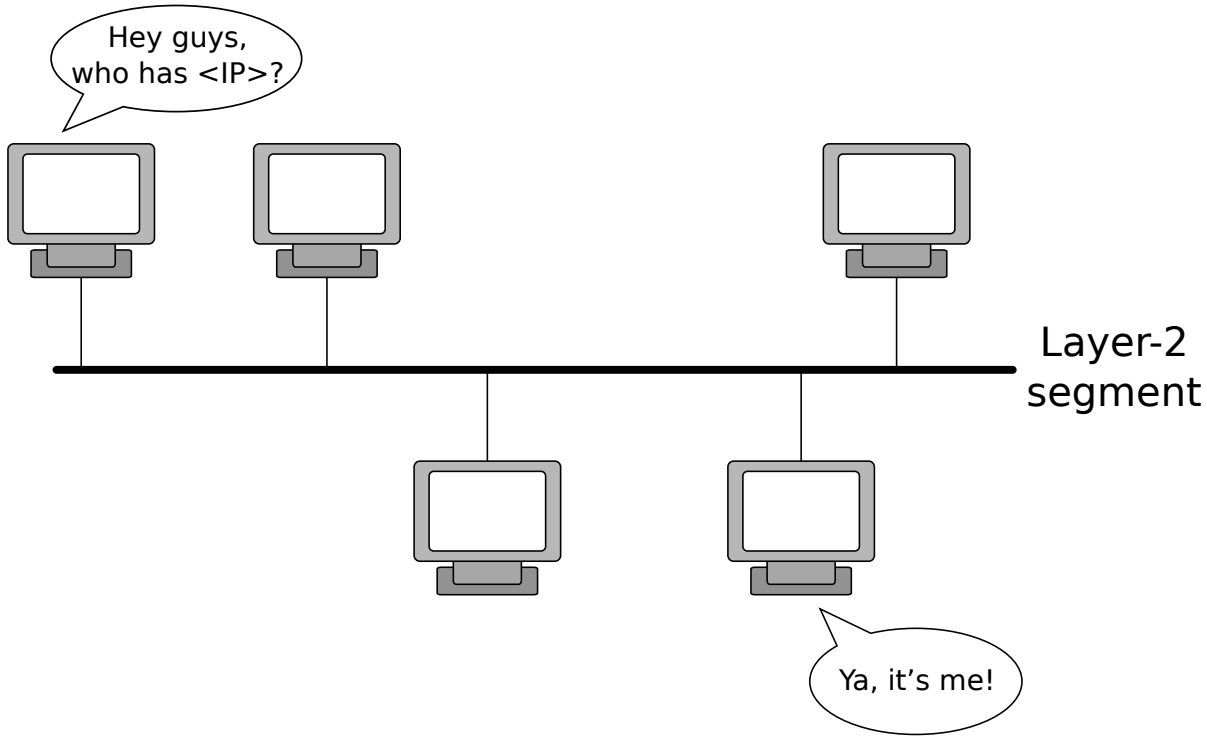

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- A machine connecting to a network,
- needs a prefix,
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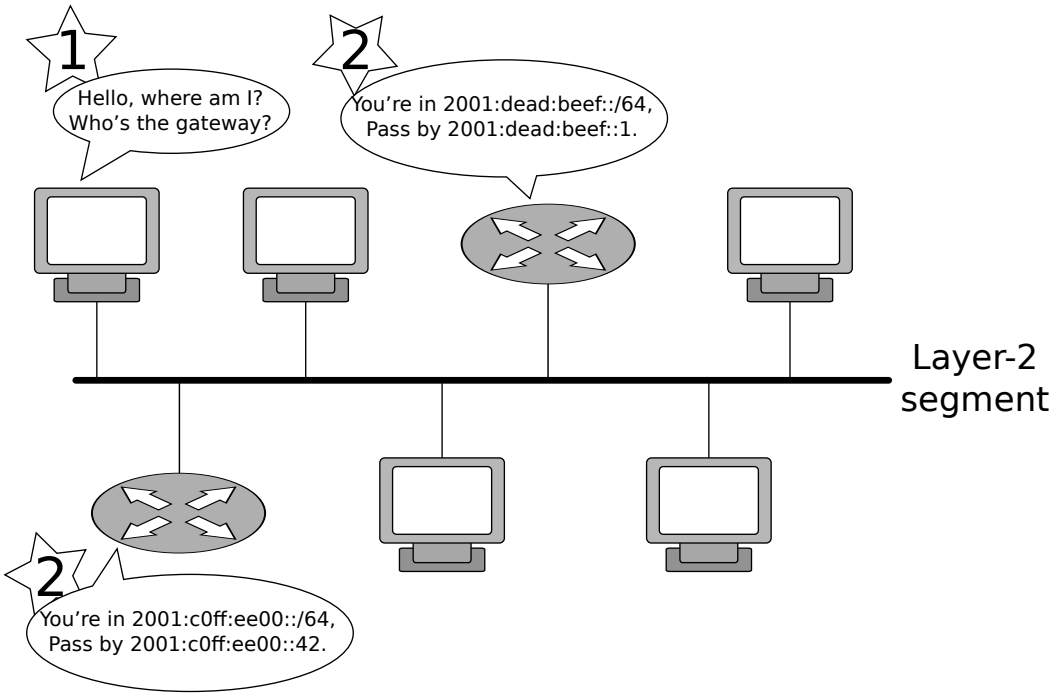
- and then. . . we have a full address.



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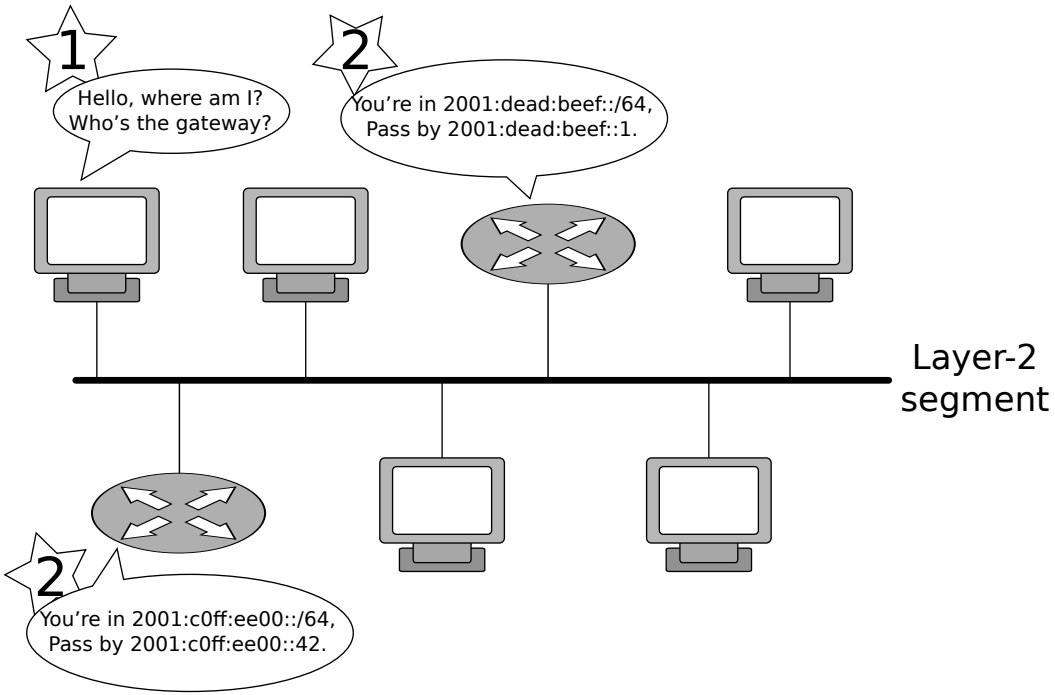

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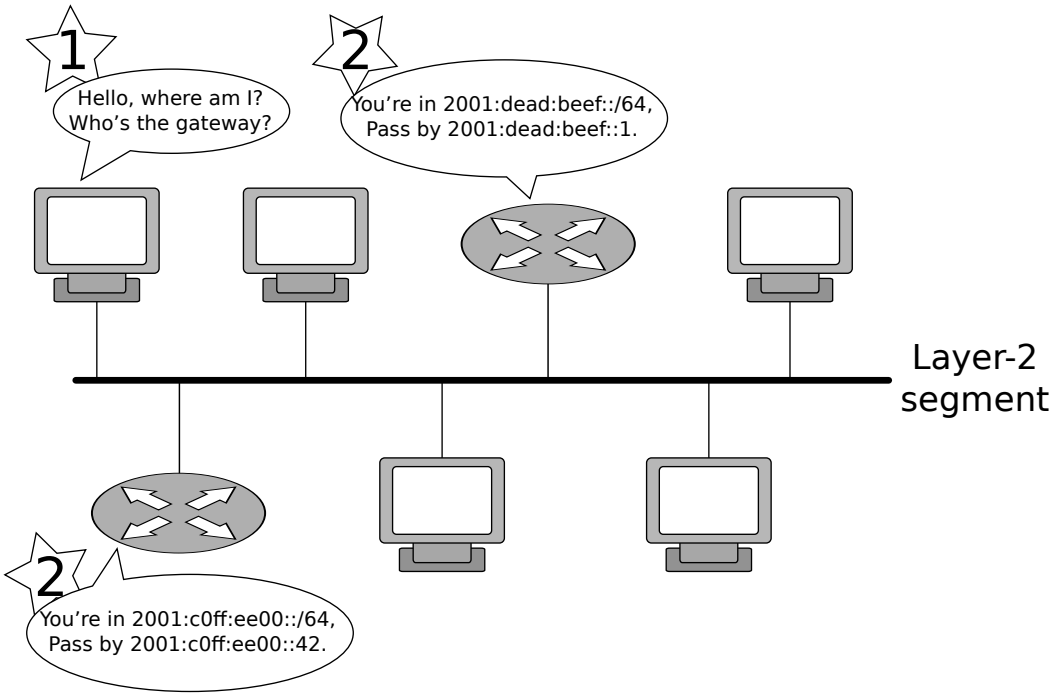

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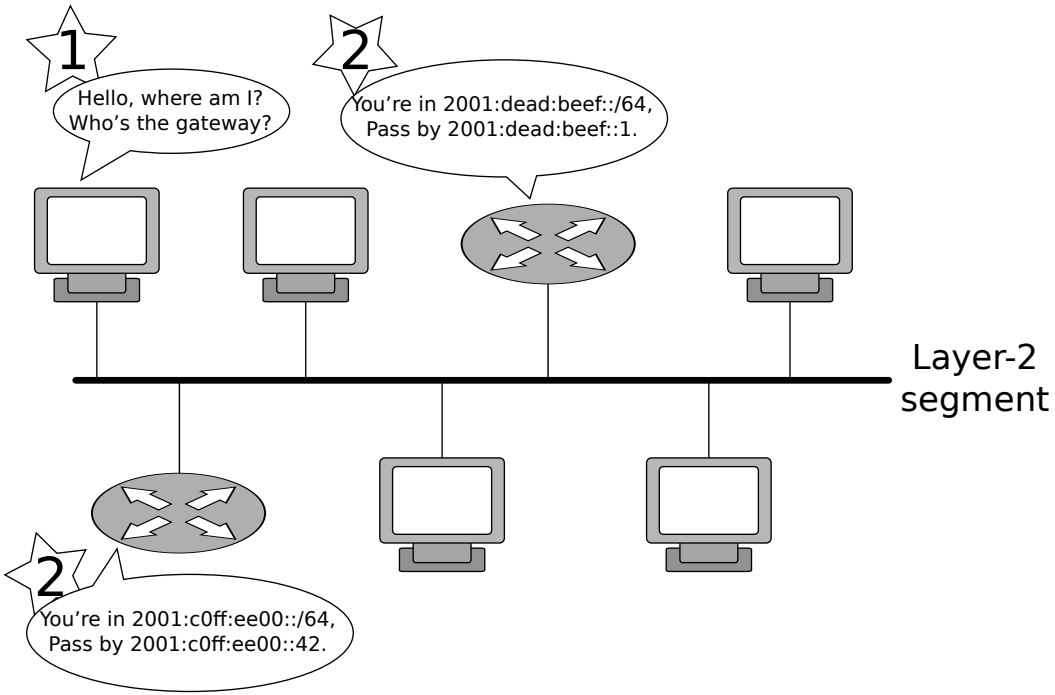

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DNS

- A host also needs a list of recursive DNS servers to query,
- and a search list.
- RFC 6106

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   - The Derridj part §
   - Link-layer address resolution
   - Address Autoconfiguration

IPv6?

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Link-layer address resolution

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Message types

- Router Solicitation/Router Advertisement (RS, RA)
- Neighbor Solicitation/Neighbor Advertisement (NS, NA)
- Route Redirection

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Link-layer address resolution

Address Autoconfiguration

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Link-layer address resolution

- Operation is quite similar to ARP
- A requests the MAC-address of B
  → Send a Neighbor Solicitation
- If B is available, it answers to A
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Link-layer address resolution

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Address Autoconfiguration

- On a regular basis or in response to a Router Solicitation, routers send Router Advertisements
- These RAs can contain: network's prefix (/64), default route, DNS servers, . . .
- A new host receive a RA, combine its information and EUI64 to create its own address and to configure itself
- The host then checks with a Neighbor Solicitation if the address was free

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   - IPsec and SEND
   - RA guard
   - Weaknesses in implementations

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IPsec and SEND

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IPsec

- Complex to setup (not only with NDP)

SEND

- Non trivial to deploy
- Does not use IPsec

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RA guard

- Implemented on some switches
- Blocks RA packets coming from unauthorized hosts
- Similar to some existing techniques to prevent ARP spoofing
- Can work in both stateless and stateful modes
- Eventually vulnerable to some kind of attacks

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- “A local network is considered safe”
- Sometimes, you don’t have the choice
- thc-ipv6 provides a nice set of tools

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Questions?

```
42sh$ gcc questions.c
gcc: No route to host.
42sh$ _
```