

**FQDNs resolution when the MAC and DNS cache are empty**  
**draft-fqdns-no-cache-bouaram-00**

Abstract

This document specifies the procedures for resolving Fully Qualified Domain Names (FQDNs) in IPv6 and IPv4 networks when both the Media Access Control (MAC) and the Domain Name System (DNS) cache are empty. The procedures aim to reduce the latency and improve the efficiency of FQDN resolution in such scenarios. The procedures described in this document are relevant for both IPv6 and IPv4 networks, and they can be implemented in hosts and routers.

About This Document

This note is to be removed before publishing as an RFC.

The latest revision of this draft can be found at <https://example.com/LATEST>. Status information for this document may be found at <https://datatracker.ietf.org/doc/draft-fqdns-no-cache-bouaram/>.

Discussion of this document takes place on the WG Working Group mailing list (<mailto:WG@example.com>), which is archived at <https://example.com/WG>.

Source for this draft and an issue tracker can be found at <https://github.com/USER/REPO>.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <https://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on 19 August 2023.

## Copyright Notice

Copyright (c) 2023 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<https://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Revised BSD License text as described in Section 4.e of the [Trust Legal Provisions](#) and are provided without warranty as described in the Revised BSD License.

## Table of Contents

<a href="#">1.</a>	Introduction . . . . .	<a href="#">2</a>
<a href="#">2.</a>	Scenario empty cache IPv4 . . . . .	<a href="#">3</a>
<a href="#">3.</a>	Proposed solution . . . . .	<a href="#">3</a>
<a href="#">4.</a>	Scenario empty cache IPv6 . . . . .	<a href="#">3</a>
<a href="#">5.</a>	Proposed solution . . . . .	<a href="#">4</a>
	Author's Address . . . . .	<a href="#">4</a>

## [1.](#) Introduction

FQDN resolution refers to the process of translating a fully qualified domain name (FQDN) into an IP address that can be used to identify and communicate with a particular network host. An FQDN is a domain name that includes all the components necessary to uniquely identify a specific host on a network, including the top-level domain (TLD), the domain name, and the hostname. In IPv4 and IPv6 architectures, FQDN resolution is typically accomplished using the Domain Name System (DNS). The DNS is a hierarchical, distributed database that stores information about domain names and their corresponding IP addresses. When a host needs to resolve an FQDN to an IP address, it sends a DNS query to a DNS server, which searches its database for the corresponding IP address and returns it to the requesting host. In this draft, we propose an alternative solution to resolve FQDN in both IPv4 and IPv6 architectures when the MAC and DNS cache of a host are empty. Our solution involves modifying the Address Resolution Protocol (ARP) in IPv4 and the Neighbor Discovery



Protocol (NDP) in IPv6 to enable direct FQDN resolution between hosts on the network.

## 2. Scenario empty cache IPv4

{ condition: empty DNS and MAC cache for Host A. Host A wants to communicate with an internal FQDN example.test on Host B. }

[HOST A] -ARP Broadcast Header[Target IP: DNS Server  
IP ]----->

[HOST A] <-----ARP unicast response from the DNS  
server-----

[HOST A] -----DNS request[Query:  
example.test]----->

[HOST A] <-----DNS  
response-----

[HOST A] -ARP Broadcast Header[Target IP: Host B  
IP]----->

[HOST A] <-----ARP unicast response from Host  
B-----

## 3. Proposed solution

We propose to add an Information Element to the Address Resolution Protocol named TLFQDN (Target Local Fully Qualified Domain Name), it would enable devices on a network to exchange additional information related to domain names when performing ARP resolution, in the same conditions as before meaning when the MAC and DNS cache are empty Host A wants to communicate with an internal FQDN example.test and via our solution the resolution can be done from the first ARP request and reduce network traffic in a LAN.

[HOST A] -----ARP Broadcast Header[TLFQDN:  
example.test]----->

[HOST A] <-----ARP unicast  
response-----

## 4. Scenario empty cache IPv6

{ condition: empty DNS and MAC cache for Host A. Host A wants to communicate with an internal FQDN example.test on Host B }

ARAM

Expires 19 August 2023

[Page 3]

[HOST A]	[DNS]	[HOST B]
---Neighbor Solicitation----->		
<--Neighbor Advertisement ----		
---DNS request----->		
<--DNS response-----		
-----Neighbor Solicitation--->		
<-----Neighbor Advertisement---		

## 5. Proposed solution

Our proposal is to send a Neighbor Solicitation message in broadcast, along with an additional Information Element (IE) called TLFQDN (Target Local Fully Qualified Domain Name), when the MAC and DNS cache of a host are empty. This will allow for the resolution of a domain name and reduce the network traffic.

[HOST A] -----Neighbor Solicitation Broadcast Header[TLFQDN:  
example.test]->

[HOST A] <-----Neighbor  
Advertisement-----

Author's Address

Salim-Amine BOU ARAM  
IMT atlantique  
Email: salim-amine.bou-aram@imt-atlantique.fr

