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Digital Emblems Indicating Protections Under International Law

Abstract

International law defines a number of emblems, such as the blue helmets of United Nations peacekeeping forces, the blue and white shield of UNESCO, and the Red Cross of the International Committee of the Red Cross, as indicative of special protections under the Geneva Conventions. Similar protections attach to journalists who wear "Press" protective emblems on the battlefield, under Article 79 of Protocol I of the Geneva Conventions and Resolution 2222 of the United Nations Security Council. The emblems of national governments and inter-governmental organizations protect diplomatic pouches, couriers, and envoys under the Vienna Convention on Diplomatic Relations. Other marks enjoy protections against mis-use under the Paris Convention, the Madrid Protocol, and the Trade-Related Aspects of Intellectual Property Rights.

Such physical emblems have a number of weaknesses (e.g., no real-time evaluation of their authenticity) and do not translate to the digital realm. This document describes a digital emblem which addresses the shortcomings of the physical emblems and makes possible the indication of protections of digital assets under international law.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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Table of Contents

1. Introduction 3
   1.1. Conventions 4
2. Protocol Overview 4
   2.1. Actors 5
      2.1.1. Approvers 5
      2.1.2. Requestors 5
      2.1.3. Observers 5
3. Digital Emblem Material in DNS 5
   3.1. Approver Credentials 5
   3.2. Digital Emblem Record 5
      3.2.1. Approver Generated Material 5
      3.2.2. Digital Emblem Record 6
      3.2.3. DER RR Presentation Format 6
   3.3. Digital Emblem Verification 7
4. To Do List 7
5. IANA Considerations 7
6. Security Considerations 7
7. Contributors 7
8. Acknowledgments 7

9. References 7
9.1. Normative References 7
9.2. Informative References 8
Authors' Addresses 8

1. Introduction

International law defines a number of emblems, such as the blue helmets of United Nations (UN) peacekeeping forces, the blue and white shield of UNESCO, and the Red Cross of the International Committee of the Red Cross (ICRC), as indicative of special protections under international law. Similar protections attach to journalists who wear "Press" protective emblems on the battlefield. The emblems of national governments and inter-governmental organizations protect diplomatic pouches, couriers, and envoys, and international law protects certain marks against counterfeiting.

Physical emblems suffer from a number of weaknesses:

- It is not possible to evaluate their authenticity in real-time,
- They are not amenable to machine readability,
- They cannot be seen in the dark,
- They may not be visible at a distance, at an oblique angle, or from the opposite side of an object,
- They may be subject to wear, obfuscation, or vandalism,
- No audit mechanism exists to prove that the presence of an emblem has been queried for,
- No mechanism exists to prevent replay attacks,
- No mechanism exists to prevent time-shifting attacks,
- No mechanism exists to prevent location-shifting attacks,
- No mechanism exists to correlate an emblem with a specific quantity of persons or items, or a physical extent,
- No mechanism exists to correlate the validity of an emblem with its use in a specific place or time,
- There is no centralized ability to revoke instances of emblems which have been compromised, are being abused, or are no longer relevant.

A digital emblem must meet certain criteria to perform its function of notification under law:

- It MUST provide a clearly detectable and unambiguous marking,
- The emblem MUST identify the authorizing party that issued it,
- The emblem MUST be robust against misuse,
- It MUST be possible to restrict the validity of an emblem by temporal or geographic scope,

- It MUST be possible to associate the emblem with a range or specific quantity of persons or items,
- It MUST be possible to associate the emblem with online services (e.g., websites, emails),
- It MUST be possible to associate the emblem with data in transit or at rest,
- It MUST be possible to associate the emblem with network-addressable equipment (e.g., routers, servers),
- It MUST be possible to associate the emblem with a physical object (e.g., building, vehicle),
- It MUST be possible to associate the emblem with a person or group of people,
- It SHOULD be possible to view an emblem in-band via a communications network, optically (e.g., QR code), or wirelessly (e.g., RFID),
- The digital emblem MUST be capable of carrying a visual representation of the emblem,
- The emblem MUST carry an unambiguous indication of the international law or laws conferring protection upon the entity marked with the emblem,
- The emblem MUST be capable of providing a reference to additional relevant information (e.g., photographs, unique identifiers) which can be used to corroborate the association of the digital emblem with the entity bearing it,
- Querying the existence of or validating a digital emblem MUST NOT impose undue risk or cost on any party to the transaction.

This document describes a protocol for the creation and publication of a digital emblem utilizing the Domain Name System (DNS) global infrastructure.

1.1. Conventions

The capitalized key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

2. Protocol Overview

The objective of the protocol is to allow organizations to digitally signal that assets are entitled to protection under law. These assets include both physical and virtual resources (servers, virtual machines, etc.) and network traffic associated with those resources. This is accomplished by associating a digital emblem attribute with the DNS domain name, or sub-domain, and/or with the IP address(es) associated with those resource(s).

The following sub-sections describe the three parties associated with the digital emblem and their roles in creating an emblem.

2.1. Actors

2.1.1. Approvers

An Approver is an organization empowered to authorize the use of the emblem. All Approvers, or an organization operating on their behalf, generate and maintain digital signing credentials in TLSA records published in the DNS (Section Section 3.1). An Approver receives requests for use of the digital emblem from Requestors. If the request satisfies all necessary requirements, the Approver generates the necessary end-entity certificate and returns it to the Requestor (Section Section 3.2.1).

2.1.2. Requestors

A Requestor is any organization wishing to use the digital emblem to protect its digital assets. The Requestor sends the necessary DNS resource information to an Approver. If the Approver approves the use of the digital emblem for the identified resources, the Requestor publishes the returned end-entity certificate in a Digital Emblem Record (Section Section 3.2.2).

2.1.3. Observers

An Observer is any entity that wishes to assess a claim of protection under the digital emblem. This is accomplished by obtaining both the Digital Emblem Record associated with a target system (domain name or IP address) published by the Requestor and the signing certificate associated with the Approver that is identified in the Digital Emblem Record. An Observer then uses the key material in the signing certificate to verify the cryptographic material published in the target's Digital Emblem Record (Section Section 3.3).

3. Digital Emblem Material in DNS

3.1. Approver Credentials

Approvers generate, publish, and maintain valid digital signing certificates for attesting to Digital Emblem Records. These signing certificates MUST be published in the DNS via DNS-based Authentication of Named Entities (DANE) TLSA Record [RFC6698].

All TLSA records MUST be protected by DNS Security Extensions (DNSSEC) [RFC4033][RFC4034] [RFC4035].

3.2. Digital Emblem Record

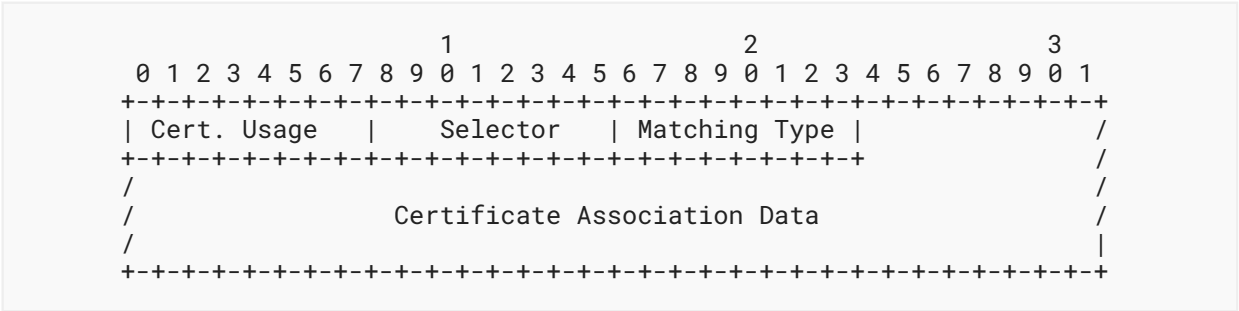
3.2.1. Approver Generated Material

Once an Approver has deemed a request to be satisfactory, it generates a certificate for use by the Requestor. After generating the certficate, the Approver returns it to the Requestor.

3.2.2. Digital Emblem Record

A Digital Emblem Record (DER) is a DNS record that declares use of a digital emblem. It is used to publish the certificate returned by the Approver to the Requestor. The DER is a new DNS Resource Record Type. Multiple DERs MAY exist for the same name. This occurs if the Requestor has received authorization from multiple Approvers. Each DER is placed in the DNS tree at the name to which it pertains.

3.2.2.1. DER RDATA Wire Format



3.2.2.1.1. Certificate Usage Field

A one-octet field where the value is selected from IANA's TLSA Certificate Usages registry [RFC6698].

3.2.2.1.2. Selector Field

A one-octet field where the value is selected from IANA's TLSA Selectors registry [RFC6698].

3.2.2.1.3. Matching Type Field

A one-octet field where the value is selected from IANA's TLSA Matching Types registry [RFC6698].

3.2.2.1.4. Certificate Association Data Field

This field contains either raw data (either the full certificate or its public key information) or the hash of the raw data.

3.2.3. DER RR Presentation Format

TBD

Publication of a DER follows all the rules for publishing DNS resource records described in [RFC1035]. The DER MUST be protected by DNSSEC.

3.3. Digital Emblem Verification

Any entity can act as an Observer and verify the existence and validity of a digital emblem associated with a target system. An Observer performs the following tasks:

1. Perform a DNS lookup for a DER associated with the target system.
2. If a DER does not exist, terminate process.
3. Extract the certificate.
4. Perform a DNS lookup for the TLSA record associated with the Issuer.
5. If the TLSA exists, extract the key material. Otherwise, terminate process.
6. Using the retrieved key material, verify the signature on the DER certificate.

If the signature verifies, the target system has protection from the digital emblem. In all other cases, it does not.

4. To Do List

TODO : Add text on necessary DANE TLSA parameters for use with the Digital Emblem per [RFC7671]

Integrate underscored naming indicator per [RFC8552].

Presentation format

Intermediate certificates.

DER certficate fields and usages (e.g., SANs).

Signaling protection of IP addresses via reverse DNS.

Legal/Policy considerations.

5. IANA Considerations

6. Security Considerations

7. Contributors

8. Acknowledgments

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