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Energy Aware Proxy Discovery for CoAP
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Abstract

CoRE defines a mechanism for resource discovery based on Web linking with discovery, registration,modification, and other procedures. But energy efficiency is very important for resource constrained devices. This specification shows an efficient method for CoAP proxy finding the resource from end-points by reducing multicast messages.

The current version -00 of this document is just an initial draft that is intended to spark discussion.

Status of This Memo

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Table of Contents

1. Introduction

The Constrained RESTful Environments (CoRE) working group aims at realizing the REST architecture in a suitable form for the most constrained nodes and networks. CoRE is aimed at machine-to-machine (M2M) applications such as smart energy and building automation [I-D.shelby-core-coap-req]. As being the main work of CORE,CoAP defined a proxy mechanism for CoAP end-point, that proxy can be tasked by CoAP clients to perform requests on their behalf [I-D.ietf-core-coap].

Since in many M2M scenarios, direct discovery of resources is not practical due to sleeping nodes, disperse networks, or networks where multicast traffic is inefficient. These problems can be solved by employing an entity called a Resource Directory (RD), which hosts descriptions of resources held on other servers, allowing lookups to be performed for those resources[I-D.shelby-core-resource-directory].

The proxy mechanism should support this RD function in resource constrained environments. There are several methods to discovery proxy by a CoAP end-point, including assuming a default location (e.g. on an Edge Router in a LoWPAN), by assigning an anycast address to the proxy, using DHCP, or using the CoRE Link Format. While reducing energy consumption is essential for battery operated nodes in some devices, which is one of the most important work in M2M communication. Node's energy usage depends on network messages it has to receive and or respond. Thus the discovery procedure should be optimized with energy aware consideration.

The 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 RFC 2119 [RFC2119].

2. Resource discovery analysis

As mentioned in other drafts, resource discovery is performed by sending either a multicast or unicast GET request to /.well-known/core and including a Resource Type (rt) parameter [I-D.ietf-core-link-format] with the value "core-rd" in the query string. Upon success, the response will contain a payload with a link format entry for each RD discovered, with the URL indicating the root resource of the RD.

After discovering the location of an RD, an end-point MAY register its resources to the RD's registration interface. This interface accepts a POST from an end-point containing the list of resources to be added to the directory as the message payload in the CoRE Link Format along with query string parameters indicating the name of the end-point, an optional node identifier and the lifetime of the registration. Upon success, the response will be 2.01 "Created" [I-D.shelby-core-resource-directory].

That means once resource discovery needs twice communication process between end-point and proxy. For energy saving point of view, this procedure should be optimized. Another draft indicates more efficient method.A CoAP server that wants to make itself discoverable sends a POST request to the default discovery URI of any Candidate CoAP Server Discovery Server [I-D.bormann-core-simple-server-discovery].

This draft shows more details about energy aware proxy discovery mechanism for CoAP.

3. Energy aware proxy discovery

3.1. Reduced Protocol Operations

The Energy aware proxy reduces discovery and registration processes into one.

The end-point acting as a server will use server IP address, the CoAP default port[I-D.ietf-core-coap], and the absolute path "/.well-known/core"[I-D.ietf-core-link-format] to build its POST request. And this request will be send to its Neighbor by unicast (as using 6LOWPAN or IPv6) or to a multicast address.

The POST request is a link-format message, which indicates the service list that requesting server wants to make known to the proxy.

End-point resources in the proxy are kept active for the period also indicated by the lifetime parameter. But unless the end-point needs to refreshing the data with update message, the data will be kept in this lifetime. Then the data will be delete automatically as expired.

The discovery interface is specified as follows:

Interaction: EP -> Proxy

Path: /.well-known/core

Method: POST

Content-Type: application/link-format

Parameters:

- Lifetime (lt): Lifetime of the registration in seconds. Range of 60-4294967295. If no lifetime is included, the response will be Failure: 4.00 "Bad Request" .

- Host (h): The host identifier or name of the registering node. The maximum length of this parameter is 63 octets. This parameter is combined with the Instance parameter (if any) to form the end-point name. If not included, the proxy MUST generate a unique Host name on behalf of the node.

- Instance (ins): The instance of the end-point on this host, if there are multiple. The maximum length of this parameter is 63 octets.

- Type (rt): The semantic type of end-point. The maximum length of this parameter is 63 octets.

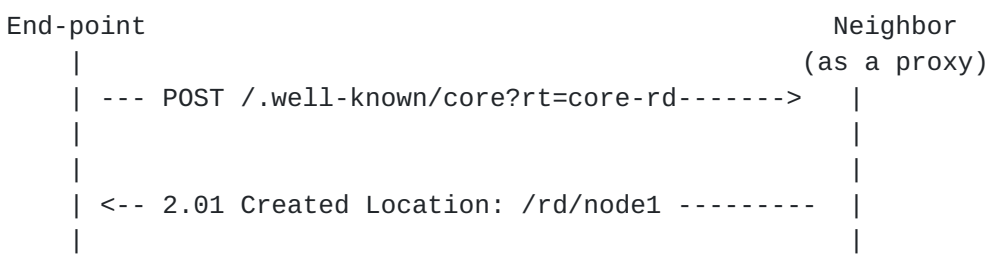
Success: 2.01 "Created". The Location header of the new resource entry for the end-point could be e.g. in the form /{rd-base}/{end-point name}

Failure: 4.00 "Bad Request". Malformed request.

Failure: 5.03 "Service Unavailable". Service could not perform the operation.

3.2 Example

The following example shows an end-point with the name "node1" POST temperature resource to a proxy using this interface.




```
Req: POST coap://[ff02::1]/.well-known/core?rt=core-rd
Payload:
</sensors/temp>;ct=41;rt="TemperatureC";if="sensor",

Res: 2.01 Created
Location: /rd/node1
```

4. Security Considerations

TBD.

5. IANA Considerations

This document does not require any IANA actions.

6. Normative References

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