Discovery and Search for IoT Devices with Semantic Identifiers and DNS Names

Simon Fernandez

May 27, 2021

Laboratoire Informatique de Grenoble, Team Drakkar

Source article

Paper will be presented at ICCCN 2021. Conference in July 2021.

Authors:

- Simon Fernandez,
- Michele Amoretti,
- Fabrizio Restori,
- Maciej Korczynski,
- Andrzej Duda,

Use case

Context

- Many devices deployed
- Different kind of devices (IP, LoRaWAN, sensors,. . .)
- Different properties

Ex: Field, City, Building,. . .

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Find all devices with given properties

- Devices in a given area
- Device types (sensor, actuator,. . .)
- Devices providing a given type of data

Encoding properties in a name

One device, many names

In DNS, we store data with a name key:

```
inria.fr IN A 128.93.162.83
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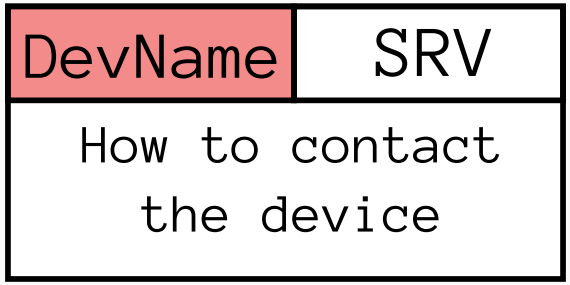

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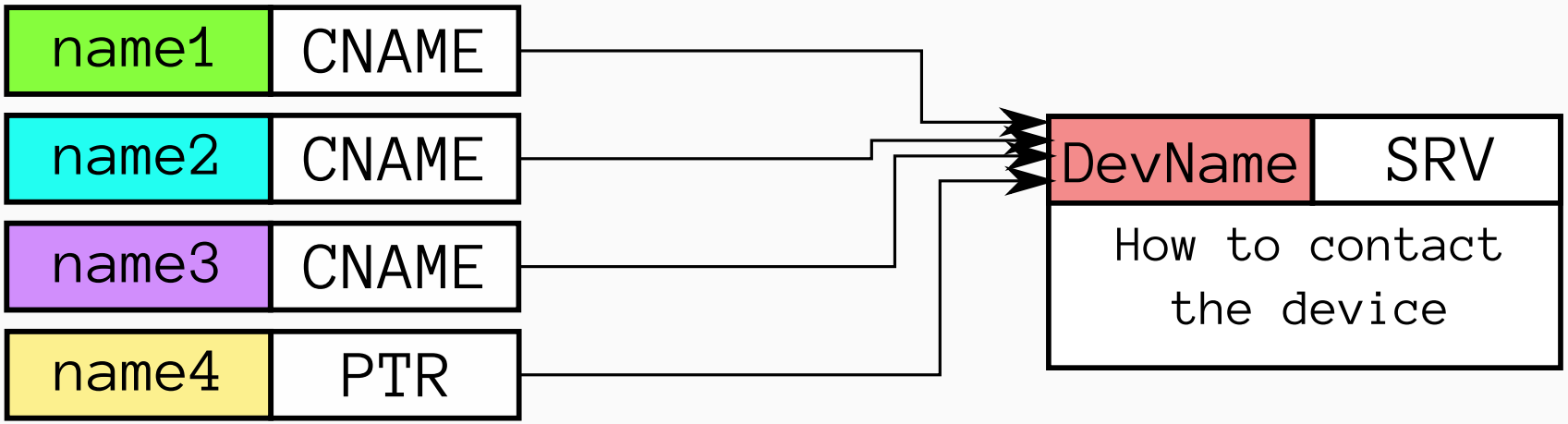
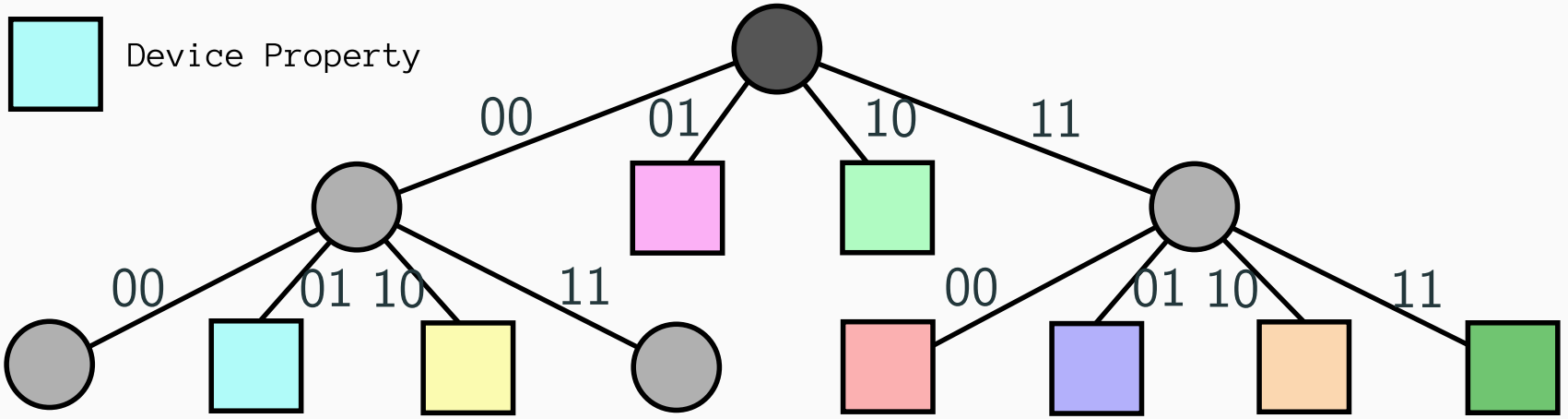


Binary tree encoding for logical position & properties



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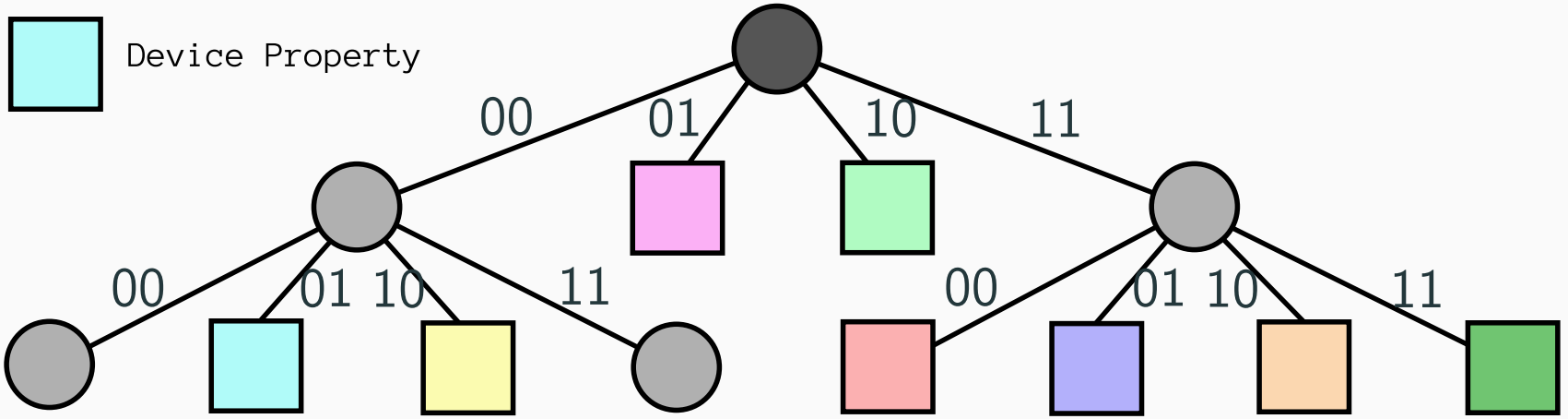

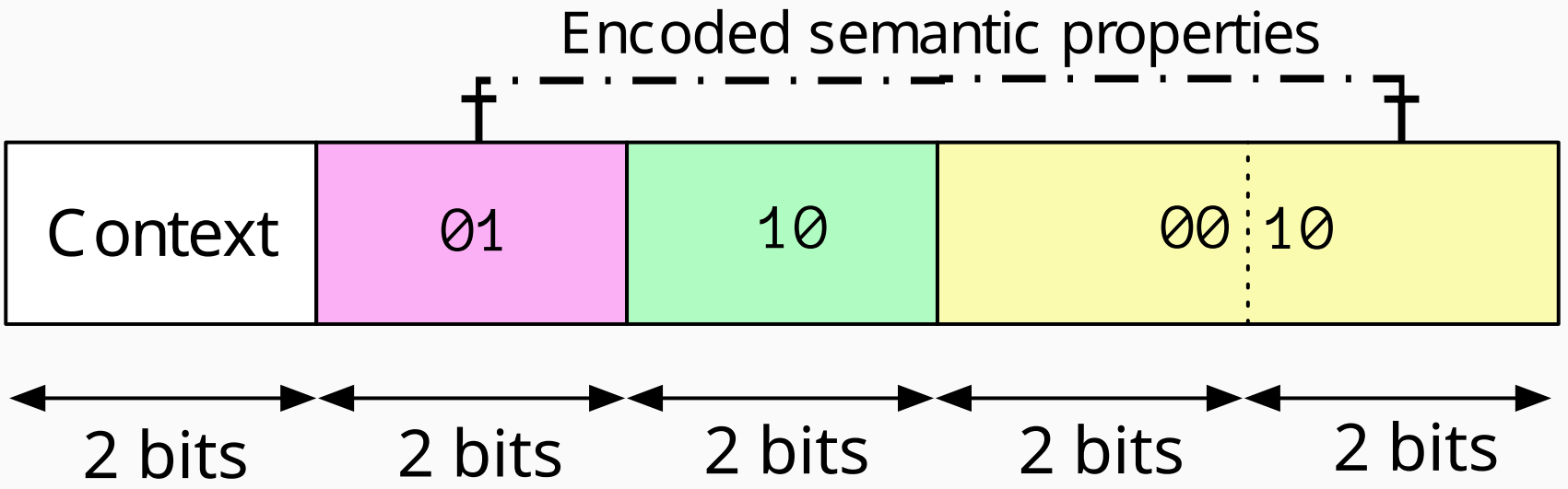

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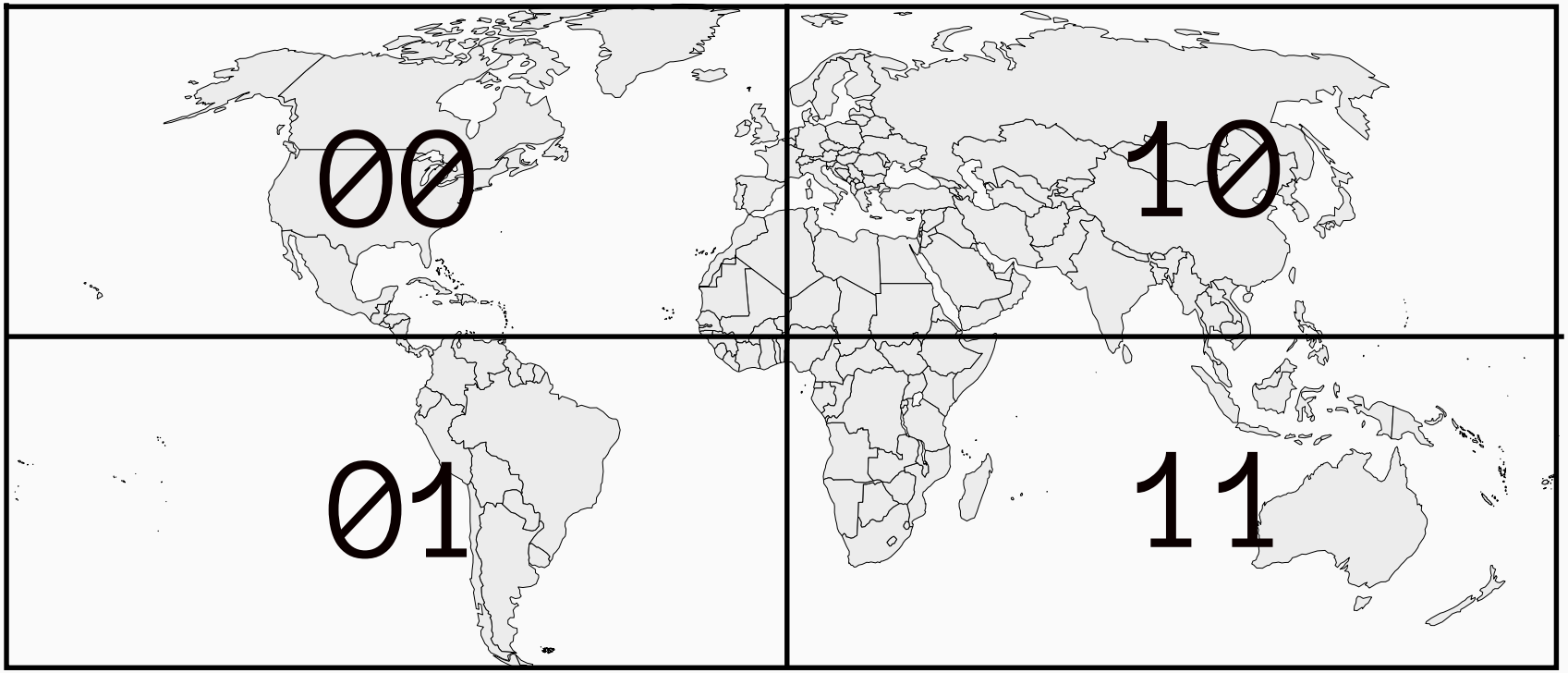

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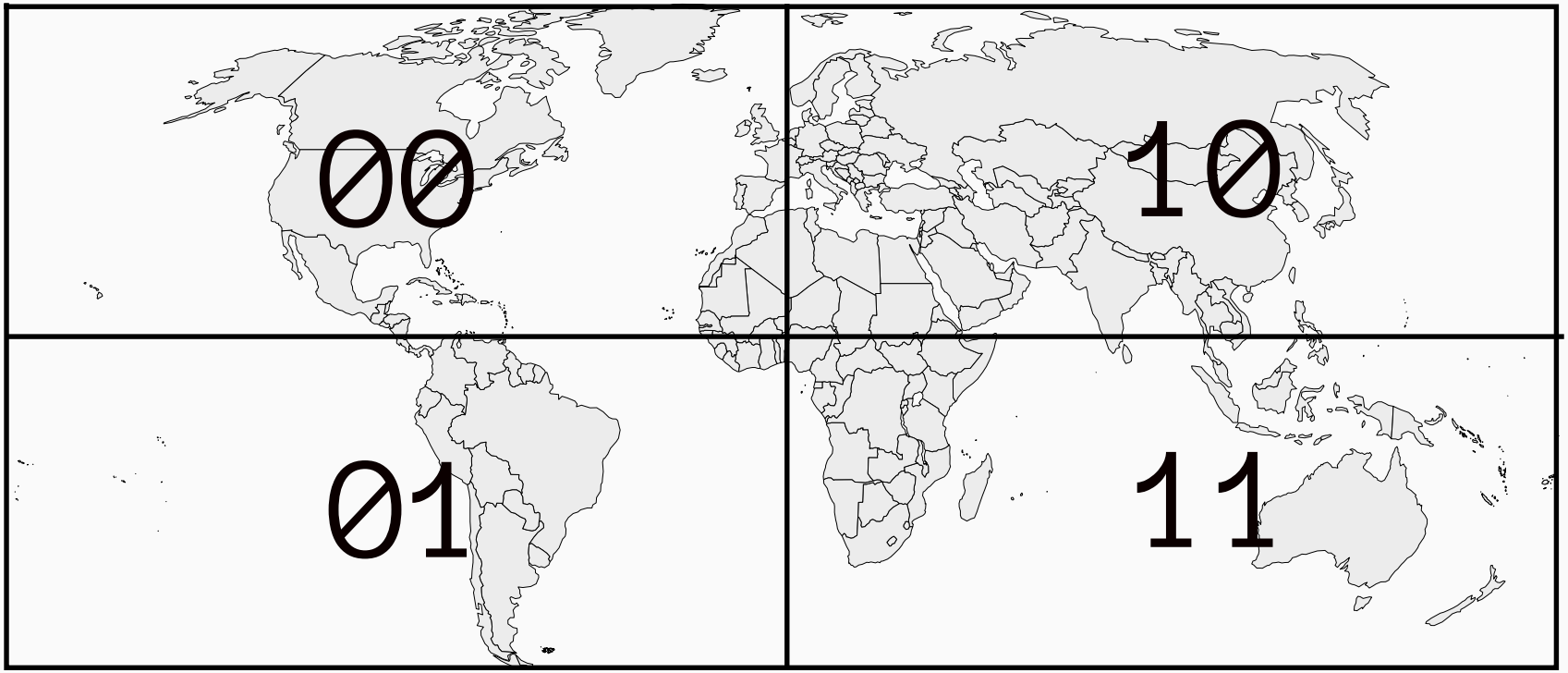

- Adaptable precision
- Prefix proximity

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`base32` encoding:

- Pure ASCII
- No similar characters (`O0-Il-ao`)

5 bits per character

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```
00001 01100 00001 00101 00010

1d152
```

Geohash precision

Length (char)	Error
1	±2500 km
4	±20 km
8	±19 m
10	±59 cm
11	±1.84 cm

Let's discover devices!

Discover a device with DNS-Service Discovery

Select the area: get the coordinates of the area

Encode the coordinates: generates a binary string

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Find devices info: `<name>._iot._udp.iot.org IN SRV`

Receive the data: IP/Protocol/Server/Port of the devices

Conclusion

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How to find devices based on their properties?

- One device can have MANY names
- Encode properties in names (geolocation, device type,...)
- Store them in the DNS
- Discover with DNS-SD

Thank you

Questions?