

Linked Data Notifications

Distributed Update Notification and Propagation on the Web of Data

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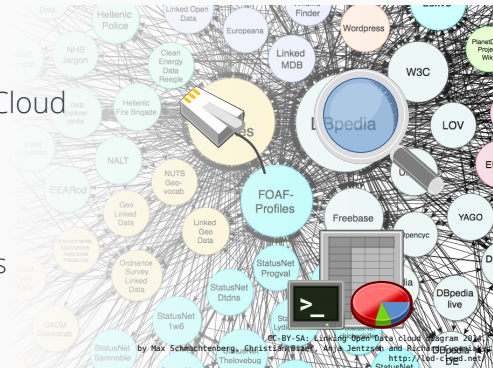
AKSW Colloquium



Motivation and Problem

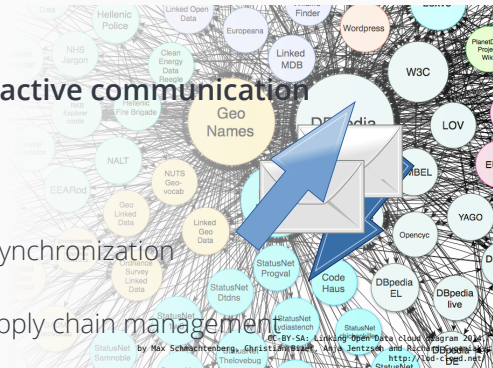
Motivation and Problem

- The Web of Data is a highly interlinked Data Cloud
- This enables us to ...
 - retrieve structured data about things
 - discover links among datasets
 - answer questions involving multiple datasets



Motivation and Problem

- But currently there is no established way for **active communication**
- This is needed for ...
 - social interaction: messages, status update, friending; DSSN)
 - subscription to updates of datasets; graph synchronization
 - distributed collaboration on structured data
 - enterprise use cases, such as distributed supply chain management



Linked Data Notifications (LDN)

Linked Data Notifications (LDN): W3C Working Draft

- A Working Draft by the W3C Social Web Working Group
- Specialized use of Linked Data Platform (LDP)
- <https://www.w3.org/TR/2016/WD-ldn-20160824/> [Capadisli and Guy, 2016]

Linked Data Notifications is a protocol to facilitate exchanging messages between applications which serve as senders, receivers and/or consumers of RDF data.

(Sarven Capadisli and Amy Guy: Linked Data Notifications)

Linked Data Notifications (LDN): Introduction

- Decoupling between applications and data storage
- A notification has its own URI which can be retrieved and reused
- The specification does not define the vocabulary of the notification contents
- Authentication and verification of notifications is encouraged

Linked Data Notifications (LDN): Summary

Sender

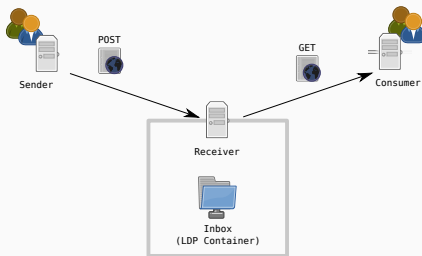
- Creates the notification body
- Sends the notification as **POST** to the Inbox URL

Consumer

- Retrieves the contents of the Inbox URL via **GET**

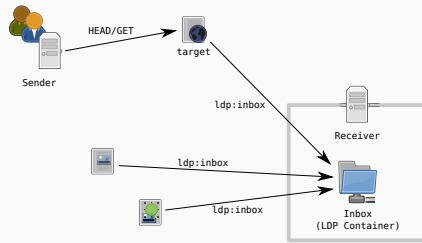
Receiver

- Responds to **GET** requests to the Inbox URL
- Accepts **POST** requests at the Inbox URL to create notifications
- Optionally enforces constraints on notifications



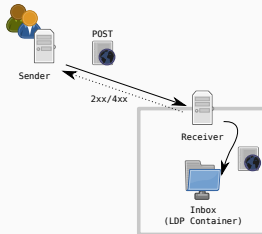
Linked Data Notifications (LDN): Protocol – Discovery

- An Inbox can be discovered from any resource
- The starting point for discovery is the *target*
- The *sender* MUST make a request for a `ldp:inbox` relation (HEAD-Link and Linked Data)



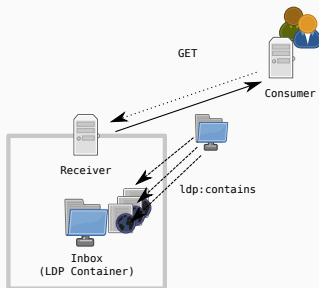
Linked Data Notifications (LDN): Protocol – Sending and Receiving

- Senders MUST deliver notifications in a POST request to the Inbox URL
- The Receiver can delay processing of the notification: **202 Accepted**
- Or immediately answer with **201 Created** or the appropriate **4xx**
- Payload defaults to JSON-LD, but can be negotiated
- “The sender MUST NOT assume that the receiver can fetch or infer anything additional from the payload, and thus MUST include everything they want the receiver to know.”



Linked Data Notifications (LDN): Protocol – Consuming

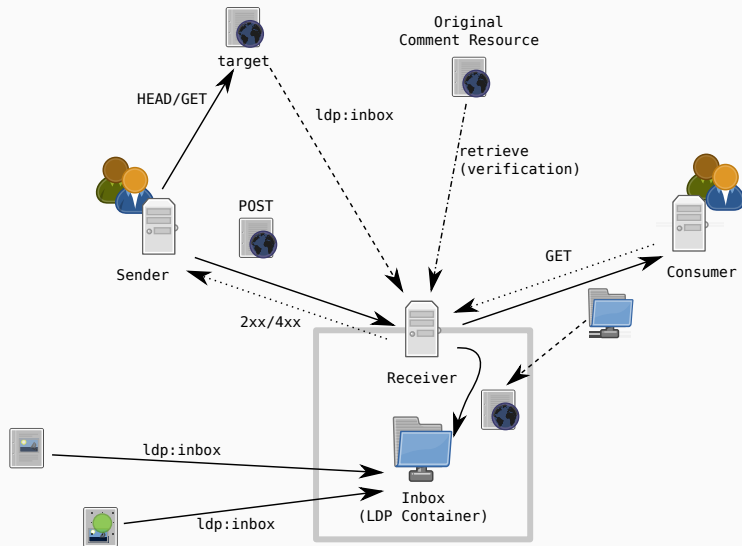
- The Receiver responds to **GET** requests on the Inbox URL
- Notifications must be discoverable through **ldp:contains**
- Payload defaults to JSON-LD, but can be negotiated



Linked Data Notifications (LDN): Protocol – Security, Privacy and Content Considerations

- Inbox URLs can announce shape constraints
- consumers may want to take precautions when consuming notifications
- Receivers SHOULD ensure or verify the sender
 - whitelist for write access
 - require authentication
 - retrieve a copy of the notification from the sender's domain to verify its origin
 - checking a digital signature which accompanies the notification

Linked Data Notifications (LDN): Summary

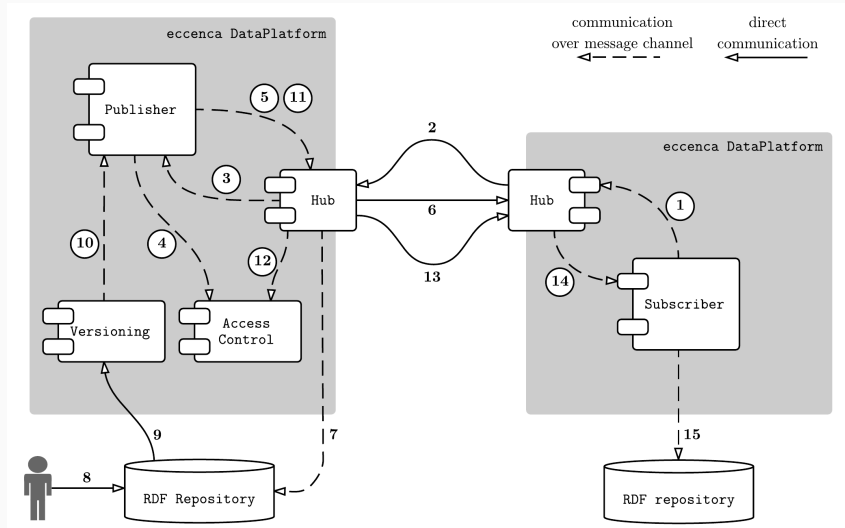


Other Approaches

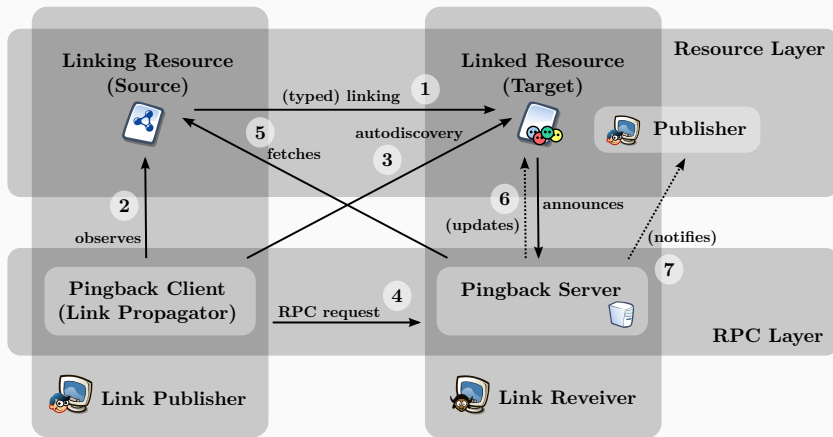
Other Approaches

- The DSSN Stack [Tramp et al., 2012] with PubSubHubbub and Semantic Pingback
- Applications in *Structured Feedback* [Arndt et al., 2016] and *Publish and Subscribe for RDF in Enterprise Value Networks* [Frommhold et al., 2016]

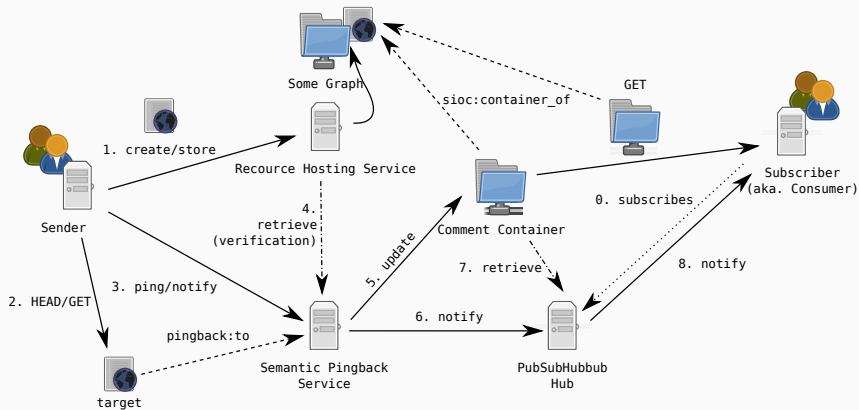
Other Approaches: Publish and Subscribe for RDF in Enterprise Value Networks



Other Approaches: Semantic Pingback and Structured Feedback



Other Approaches: Semantic Pingback and Structured Feedback




- In contrast to LDN the roll of the *Receiver* is distributed among the *Semantic Pingback Service* and the *PubSubHubbub Hub*
- The roll of the *Inbox* is done by the *Comment Container*, while it doesn't necessarily be a LDP, but any Linked Data RDF
- The Actual notification resource stays at its origin and doesn't need to be copied and transferred for the protocol

Discussion

- This Working Draft is a good starting point for active communication on Linked Data
- A W3C standard can help us to actually use RDF for communication and create meaningful communication
- Less polling, more pushing

Discussion

- Why using exactly JSON-LD as default and not any other RDF serialization?
- Why do all participants MUST support JSON-LD?
- Why should the payload replicate and contain the complete notification resource and the references information? Why not build links and reference it?
- “Decoupling between applications and data storage” (4). Maybe also the tasks of the services and the different kinds of data storages can be decoupled.
- Why restrict the protocol to LDP and not also allow the resources to e.g. be managed by a SPARQL 1.1 endpoint?

 Arndt, N., Junghanns, K., Meissner, R., Frischmuth, P., Radtke, N., Frommhold, M., and Martin, M. (2016).

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work in progress.

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-  Tramp, S., Frischmuth, P., Ermilov, T., Shekarpour, S., and Auer, S. (2012).
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