IETF 115 – 6lo

~~Native Short Addressing for LLN Expansion~~ Path-Aware Semantic Addressing (PASA) for Low power and Lossy Networks

draft-li-6lo-path-aware-semantic-addressing

IETF 115 – London

Since IETF 114

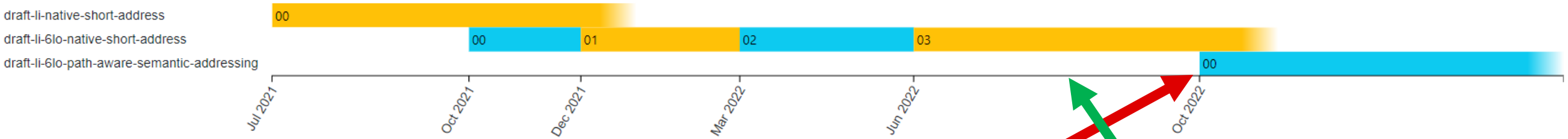
Path-Aware Semantic Addressing (PASA) for Low power and Lossy Networks

draft-li-6lo-path-aware-semantic-addressing-00

Status | IESG evaluation record | IESG writeups | Email expansions | History

Versions:

00



draft-li-6lo-path-aware-semantic-address-00.txt
October 2022
Goodbye NSA => Welcome PASA
Welcome as well to:
- Kiran Makhijani
- Pascal Thubert

End August closing Call for adoption
Not adopted but good discussion ☺

(Thank you all who sent feedback)

Call for adoption outcome

- **Three clarification points from the chairs**

1. Clarifying and/or better detailing the motivation for the draft and its expected applicability (in terms of use cases, scenarios and underlying technologies).

2. Clarifying the expected advantages of this work in comparison with existing functionality. Two main areas to consider are: i) header compression (e.g. comparing with 6LoWPAN or SCHC header compression), and ii) multihop delivery (e.g. comparing with RPL, use of BIER, etc.).

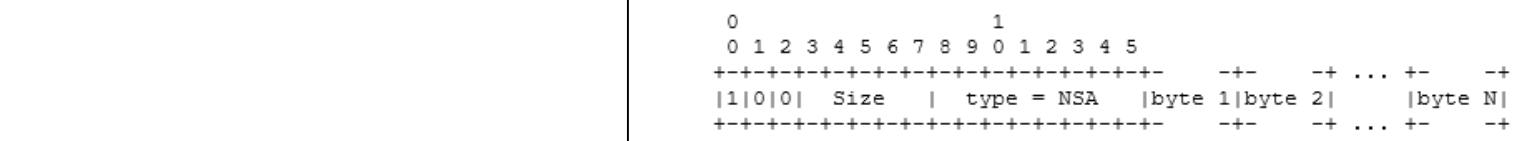
3. Clarifying whether the work is actually in scope for 6lo (e.g. not rather L2 work).

- **Additional use-case from Kiran:**

```
Hello,
I have quickly skimmed through the document and would like to see this work progress.

I see that the focus is mainly on wireless constrained devices, however, in industrial networks with
field devices it is useful to have short and variable addressing schemes on a factory floor. Variable
addressing approach is more interesting here because, on one side the controllers may use IPv6
addresses and field-devices on the other end can very well be shorter addresses.

I support this document and wouldn't mind contributing to the alignment with above mentioned
scenario.

Cheers,
Kiran
```

- **Proposal to use a Routing Header from Pascal:**

Thinking about it, an easier sell would be to make it an alternate of https://www.rfc-editor.org/rfc/rfc8138#section-5.1, like:



Where N = Size + 1, and NSA = 7

Where bytes 1 ..N are the byte-aligned bitmap that NSA produces, padded with 0s on the left (since apparently the address starts with a 1). This encoding allows the number of bytes to grow with the network

Updates in a Nutshell

Table of Contents

- New name
  - Better expressing the core approach
- Extensive Use Cases Section
  - Including more explicit connection to draft-ietf-6lo-use-cases
- New header format
  - 6lo Routing Header
- Allocation function and forwarding algorithm remain unchanged

Main applicability area

- From draft-ietf-6lo-use-cases

	Z-Wave	BLE	DECT-ULE	MS/TP	NFC	PLC
Usage	Home Auto-mation	Interact w/ Smart Phone	Meter Reading	Building Auto-mation	Health-care Service	Smart Grid
Topology & Subnet	L2-mesh or L3-mesh	Star & Mesh	Star No mesh	MS/TP No mesh	P2P L2-mesh	Star Tree Mesh
Mobility Requirement	No	Low	No	No	Moderate	No
Buffering Requirement	Low	Low	Low	Low	Low	Low
Latency, QoS Requirement	High	Low	Low	High	High	Low
Transmission Frequency Feature	Infrequ-ent	Infrequ-ent	Infrequ-ent	Frequent	Infrequ-ent	Infrequ-ent
RFC # or Draft	RFC7428	RFC7668, RFC9159	RFC8105	RFC8163	draft-ietf-6lo-nfc	draft-ietf-6lo-plc

4 main uses cases detailed

Smart Grid

Smart Home

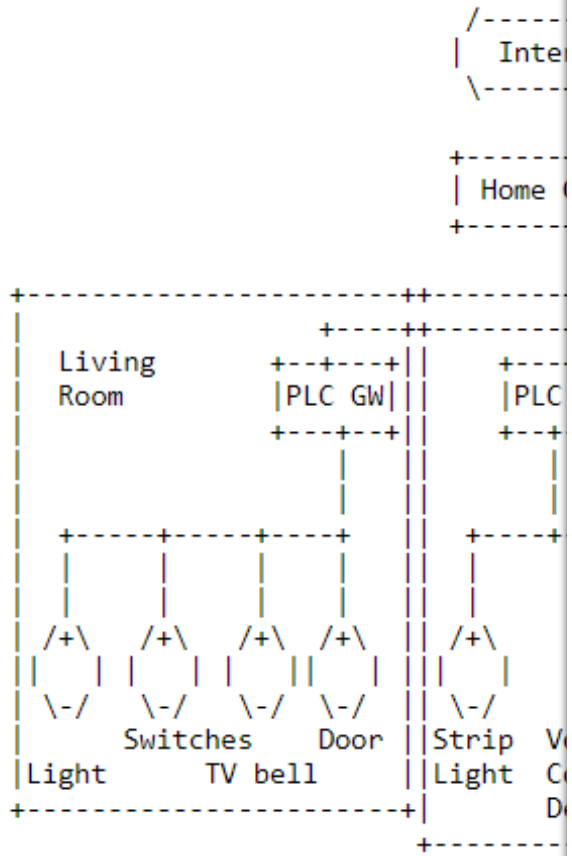


Figure 2: The topo

Data Center Monitoring

NMS:Network
SC :Supervis
FSU:Field Su

Figure 3:

Industrial Operational Technology Networks

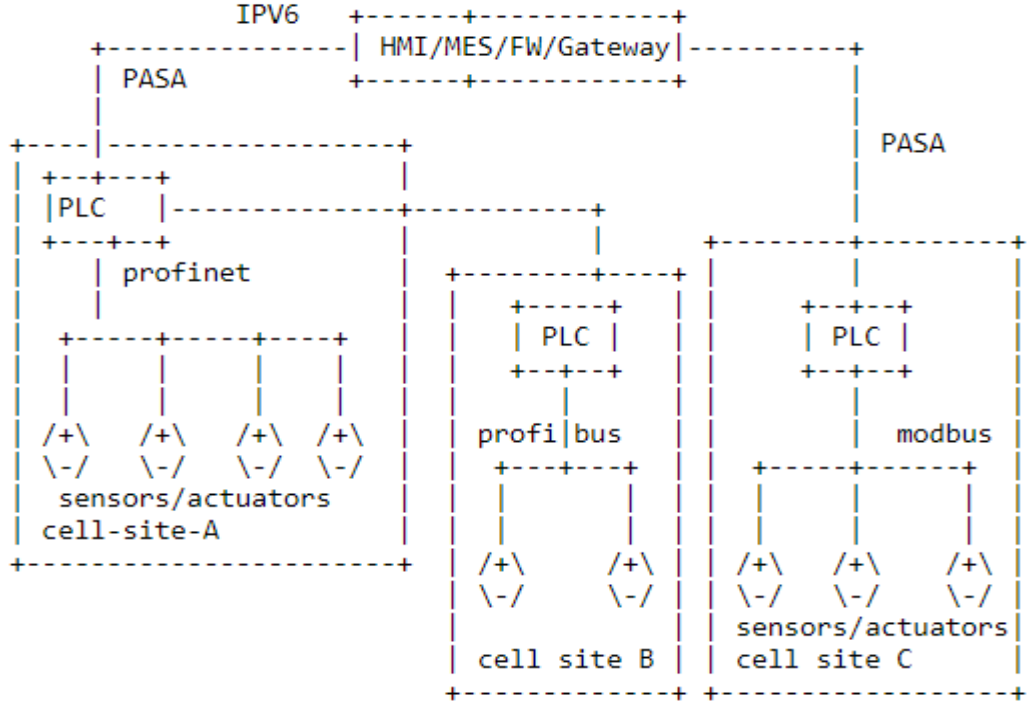
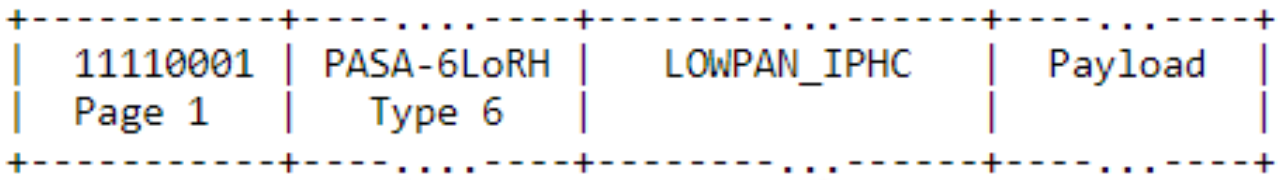


Figure 4: Industrial Operational Technology Network topology.

New Header Sequence

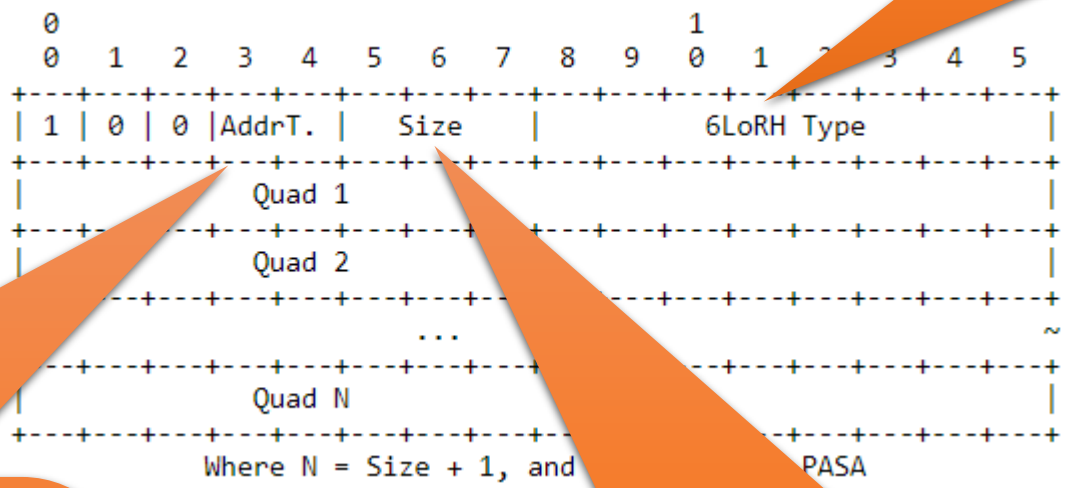


Using 6LowPAN Routing Header defined in RFC 8138

IPv6 compressed header according to RFC 6282

New Header Content

6LowPAN Routing Header Type



Addr. Type	Address Type in the PASA 6LoRH header
00	Size is set to 15 and Quad 1 to Quad N carry a full IPv6 address as destination
01	Quad 1 to Quad N carry Mapped Short Address as destination
10	Quad 1 to Quad N carry PASA as destination and Source Address
11	Quad 1 to Quad N carry PASA as destination

Length of the PASA address in quads (i.e. 2 octets). The length N equals Size plus 1, i.e. the length of the PASA address in is at least 1 quad (2 octets) and no more than 16 octets (equal to a non compressed IPv6 address).

PASA-6loRH and LOWPAN_IPHC Co-existence

- PASA domain the compress/uncompress addresses according to this specification
- The reference prefix of the PASA domain represents a context that can be used to compress addresses in accordance to RFC 6282 and decompress using the context and the coalescence procedure in RFC 8138
- When sending:
  - Create LOWPAN_IPHC compressed header, where the source addresses is statefully compressed using the context and the destination address completely elided
  - The destination address is then encoded in the PASA-6loRH in its shorter form, setting the Address Type and Size accordingly
- When receiving:
  - Since the destination address is completely elided in LOWPAN_IPHC the IID is obtained by its encapsulation, in this case the PASA-6loRH
  - The full destination address, including the IID, can be obtained via a coalescence operation with the PASA prefix in the context as described in Section 4.3.1 of RFC 8138
  - The same coalescence operation is done on the source address, in order to have the full 128-bits length.

Next Steps

- Algorithmic part of the document still stable
- Please send feedback on the new format
  - External communications to be refined

THANKS!