IETF 118 – 6lo

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

~~draft-ietf-6lo-path-aware-semantic-addressing-02~~

draft-ietf-6lo-path-aware-semantic-addressing-03

L. Iannone, G. Li, D. Lou, P. Liu, R. Long, K. Makhijani, P. Thubert

IETF 118 – Prague

Since IETF 117

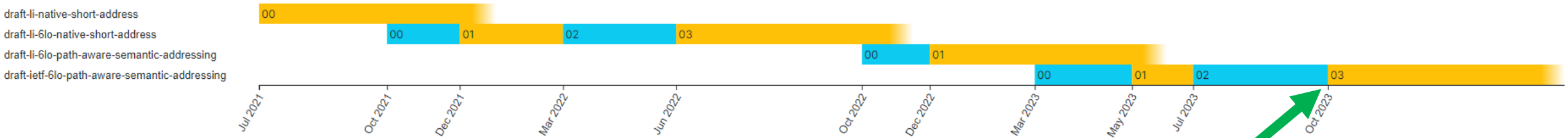
Path-Aware Semantic Addressing (PASA) for Low power and Lossy Networks

draft-ietf-6lo-path-aware-semantic-addressing-03

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

Versions:

00 01 02 03



draft-ietf-6lo-path-aware-semantic-address-03.txt
October 2023
Main changes: Small fixes (document stable)

References updates (new RFCs)

As mentioned in Section 1, the [I-D.ietf-6lo-use-cases] provides some 6lo use cases with wired connectivity, tree-based topology, and no mobility requirement (cf. Table 2 of [I-D.ietf-6lo-use-cases]). These use cases, where PASA can be used, include Smart Grid, Smart Building, etc. The PASA solution utilizes stable and static topology information to allocate addresses for nodes, which enables stateless forwarding. It saves overhead of messages triggered by routing protocols and reduces RAM footprint for routing table storage. Thus, it will reduce the overall energy consumption. The PASA forwarding logic is extremely simple, few lines of code are sufficient to implement the stack. It enables the solution being ported onto very constrained nodes. In the following paragraphs, we will dive deeper into a few use cases to demo the applicability of the PASA solution.

As mentioned in Section 1, the [RFC9453] provides some 6lo use cases with wired connectivity, tree-based topology, and no mobility requirement (cf. Table 2 of [RFC9453]). These use cases, where PASA can be used, include Smart Grid, Smart Building, etc. The PASA solution utilizes stable and static topology information to allocate addresses for nodes, which enables stateless forwarding. It saves overhead of messages triggered by routing protocols and reduces RAM footprint for routing table storage. Thus, it will reduce the overall energy consumption. The PASA forwarding logic is extremely simple, few lines of code are sufficient to implement the stack. It enables the solution being ported onto very constrained nodes. In the following paragraphs, we will dive deeper into a few use cases to demo the applicability of the PASA solution.

Artworks updated to avoid IDNITS complains

skipping to change at *page 7, line 31*

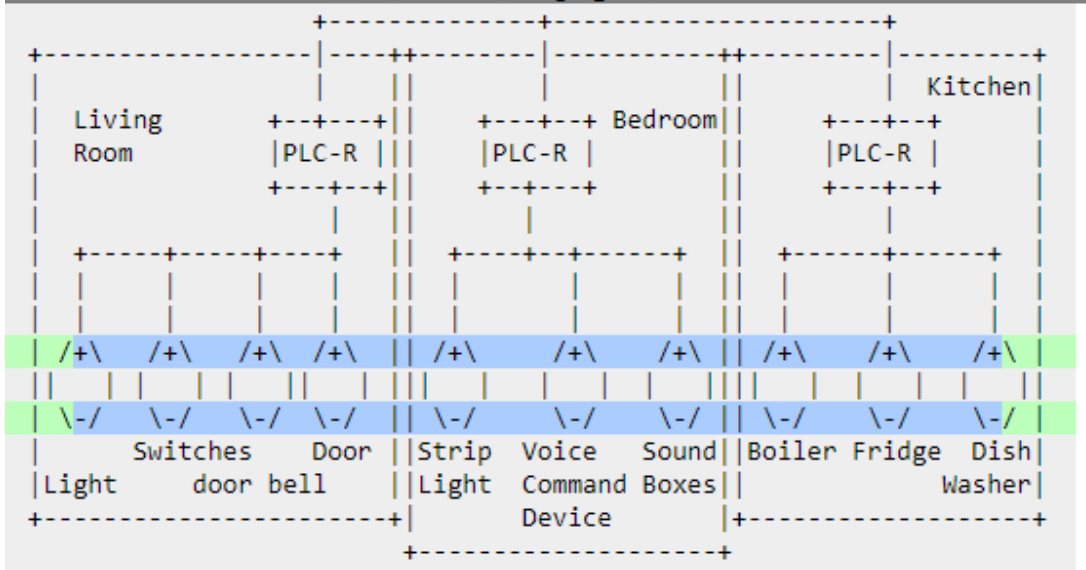


Figure 2: The topology of smart home.

.3. Data Center Monitoring

Data centers is a significant infrastructure, which requires numerous

skipping to change at *page 7, line 31*

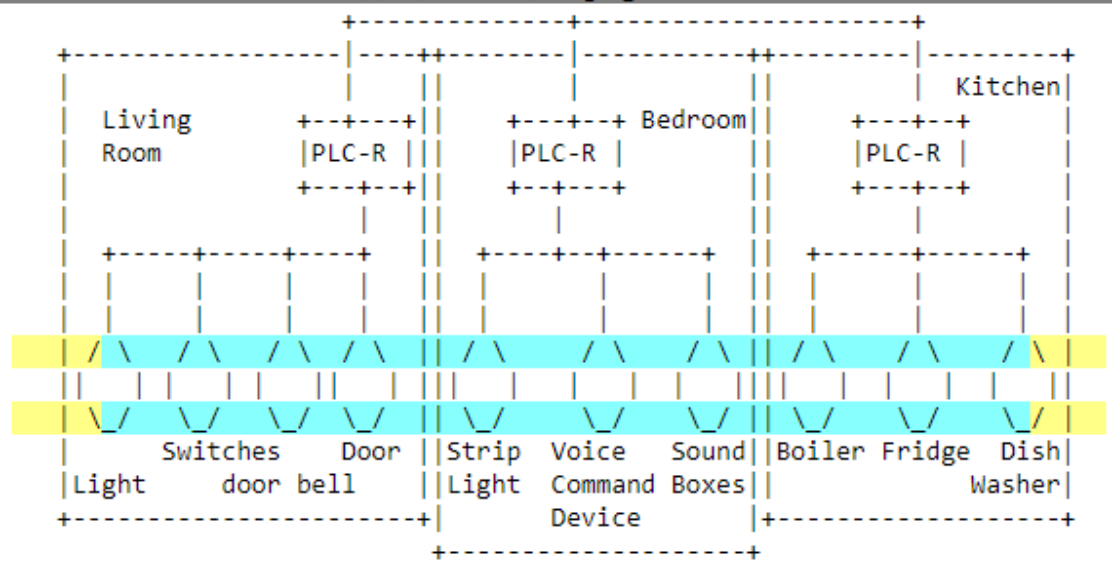
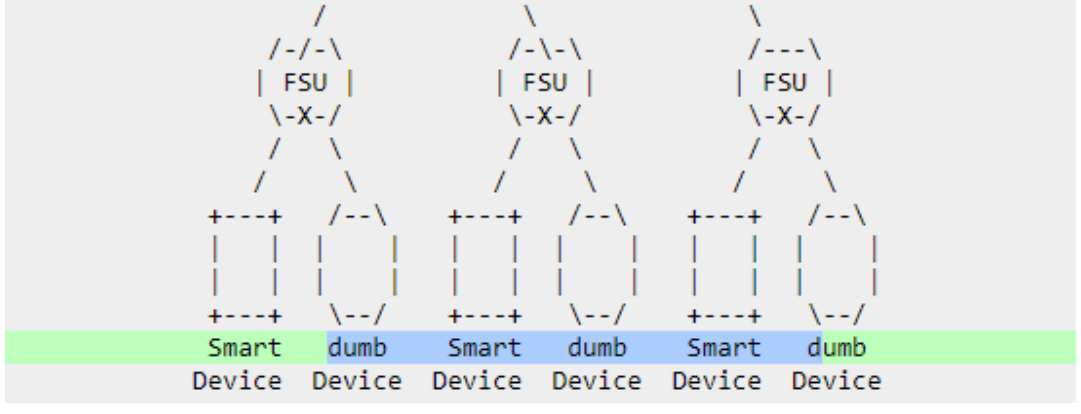


Figure 2: The topology of smart home.

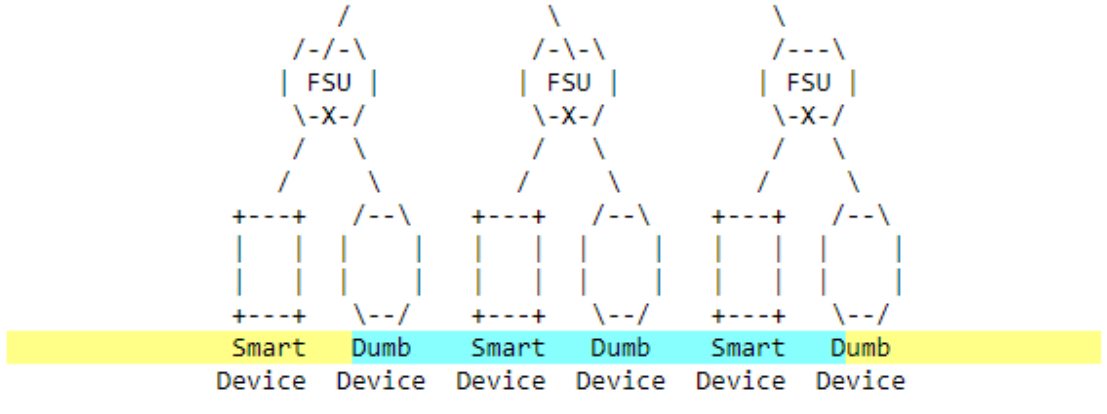
4.3. Data Center Monitoring

Data centers is a significant infrastructure, which requires numerous

skipping to change at *page 8, line 38*



skipping to change at *page 8, line 38*



Text updates to address comments

The address assignment described in this document relies on the address registration mechanism described in [RFC8505] (see Section 10). The PASA Root and PASA Routers have to act as IPv6 ND Registrars. Each node acquiring a PASA address firstly needs to select a parent node by choosing among the nodes that replied with a Router Advertisement (RA) after an initial Router Solicitation (RS). A "first come first served" selection policy is sufficient. Then it registers its link-local address to the selected parent, asking at the same time for a PASA address. In its reply the parent will propose an address according to the node's role, which is indicated in the 6LowPAN Capability Indication Option (see Section 9). The proposed address is algorithmically calculated using an Address Allocation Function (AAF). The address assigner is the parent of the node and becomes as well the default gateway from a routing perspective (used for destinations that are not in the local PASA domain). The node will then ignore replies from other neighbors.

The address assignment described in this document relies on the address registration mechanism described in [RFC8505] (see Section 10). The use of multicast messages are limited as for [RFC8505]; no new multicast requirements are introduced. The PASA Root and PASA Routers have to act as IPv6 ND Registrars. Each node acquiring a PASA address firstly needs to select a parent node by choosing among the nodes that replied with a Router Advertisement (RA) after an initial Router Solicitation (RS). A "first come first served" selection policy is sufficient. Then it registers its link-local address to the selected parent, asking at the same time for a PASA address. In its reply the parent will propose an address according to the node's role, which is indicated in the 6LowPAN Capability Indication Option (see Section 9). The proposed address is algorithmically calculated using an Address Allocation Function (AAF). The address assigner is the parent of the node and becomes as well the default gateway from a routing perspective (used for destinations that are not in the local PASA domain). The node will then ignore replies from other neighbors.

- Multicast? (by Carles G.)

10 (just looking at the preceding 0, cf. Section 6), a PASA Router directly connected to the root. So this leads to the path: 1 -> 10 -> 1010 -> 101011. This example is build using the topology in Figure 6. In deployments where the PASA domain is directly connected to the open Internet, it is preferable not to expose the internal topology. This can be achieved, for instance, by putting the domain behind a NAT66 [RFC6296], which can be co-located with the root node.

cknowledgements

10 (just looking at the preceding 0, cf. Section 6), a PASA Router directly connected to the root. So this leads to the path: 1 -> 10 -> 1010 -> 101011. This example is build using the topology in Figure 6. In deployments where the domain is directly connected it is advisable to avoid expose the inner topology to the open Internet.

Acknowledgements

- Avoid mentioning NAT66 (by Eric K.)

Next Steps

- **Document (really) Stable!**
  - **Relationship with GAAO ?**

THANKS!