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Considerations for Lightweight IP Gateways
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Abstract

This document discusses several considerations of the gateway that connects the IPv6 smart devices with the non-ready IPv6 Internet.

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on September 7, 2011.

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1. Introduction

The ultimately goal of enabling IP stack on small devices is to connect them to the global Internet. Many efforts are dedicated to compressing IPv6 header for smart devices [RFC4944] [I-D.ietf-6lowpan-hc] so that the smart objects network is IPv6 ready. However the connection from the gateway to the outside network is still evolving to the IPv6; many parts of the network is still IPv4, especially for home users. And many Internet application servers are not IPv6 ready. The IPv6 smart device could not connect to the IPv4 service platform without intermediate boxes.

In this situation, it is important to discuss how to connect the IPv6 ready smart objects network to the non IPv6 ready global Internet. This document introduces several identified problems and some considerations on solutions to these problems.

1.1. Conventions used in this document

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 [RFC2119].

2. Network Architecture and Scenarios

Figure 1 depicts the secenario of the interconnection between the smart objects network and the Internet. Several important components within this architecture is analyzed below:

1. Node: the smart device. In current IETF efforts, the Node is IPv6 ready and IPv6 only. Numbers of the Nodes constitute the smart objects network, which is IPv6 ready.
2. SNG: Smart Network Gateway. The SNG interfaces with the smart objects network and the operators's access network. The SNG should support the wireless technolgies connecting with the Node and the lightweight IPv6 implementation as well. The upper connection from the SNG to the access network depends on the capability provided by the operator.
3. ONG: Operator Network Gateway. The ONG may not be visible to users. It is used to apply charging, security and QoS policies. In certain scenarios, the ONG is used to manage an IPv6-in-IPv4 tunnel between the SNG and itself.
4. Server: the applicatoin server. The server may be IPv4 or IPv6, or dual-stack. It collects information from the smart network and share/push these information to users Internet wide.

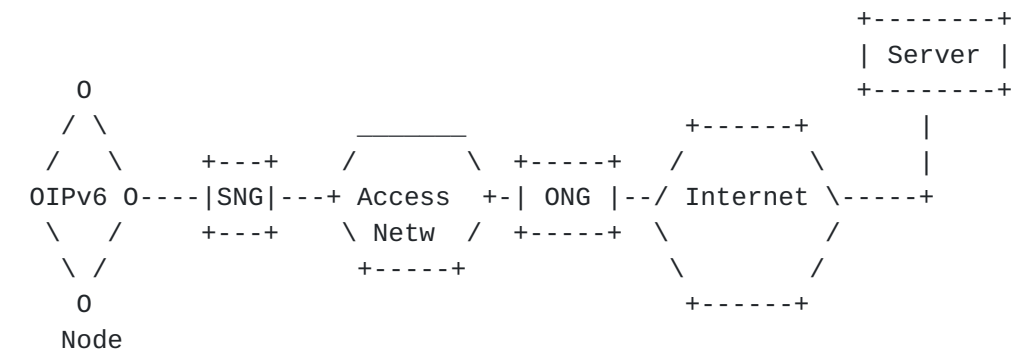

Figure 1: Smart Network Connecting the Internet

3. Solution Considerations

When both the access network and the application servers are IPv6 enabled, the solution to this problem is trivial as far as we can see. The communication between the Node and the Server is end-to-end.

When the server is not IPv6 ready or part of the network is not IPv6 ready, several solutions need discussion at the current point. This section discusses several considerations on the solutions.

3.1. Aggregated Smart Network Gateways

In this sense, the connection between the Node and Server is not end to end. Rather, the SNG aggregates the information collected from the smart devices and sends the aggregated message to the service platform. As long as the SNG is enabled with Server the same IP family, the rest of the work is trivial.

Most existing applications follow this non end-to-end architecture. But in this architecture, the SNG should be implemented with service logical and its scalability is challenged.

3.2. Tunneling IPv6

When the server is IPv6 ready but part of the network is not IPv6 ready, tunneling the IPv6 within the IPv4 packets is a direct solution.

For example as shown in Figure 2, the access network is IPv4 only and the Internet and Server is dual stack. The SNG and ONG should establish an IPv6-in-IPv4 tunnel. The SNG encapsulates the IPv6 packets within the IPv4 header to the ONG and ONG de-capsulates the IPv6 packet and sends to the service platform. Softwire tunnels

[I-D.ietf-softwire-dual-stack-lite] may be used in this scenario.

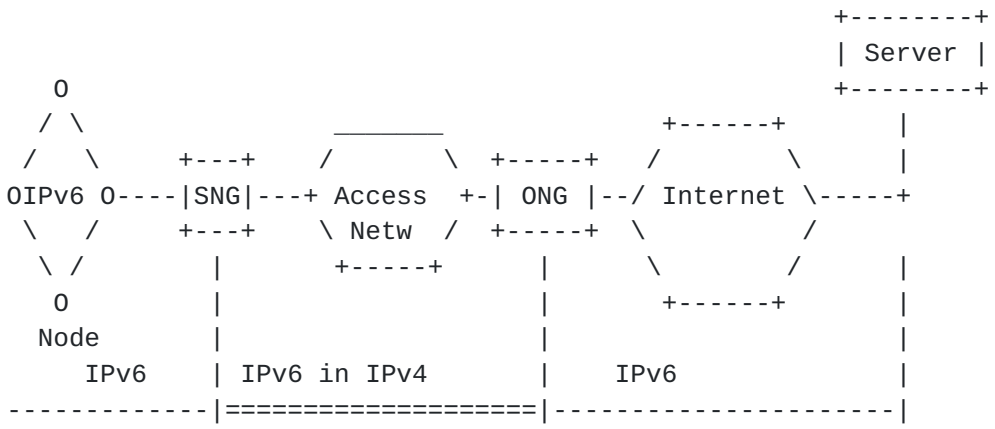

Figure 2: Tunneling Solution

3.3. IP Family Translation

If the service platform is IPv4 only, the need of IPv6 to IPv4 translation is indispensable.

In Figure 3, the SNG does not translate the IPv6 directly. Rather, SNG tunnels the IPv6 packets to the ONG within the IPv4, and the ONG decapsulates and translates the IPv6 to IPv4, using stateless or stateful translation [I-D.ietf-behave-v6v4-xlate-stateful] [I-D.ietf-behave-v6v4-xlate].

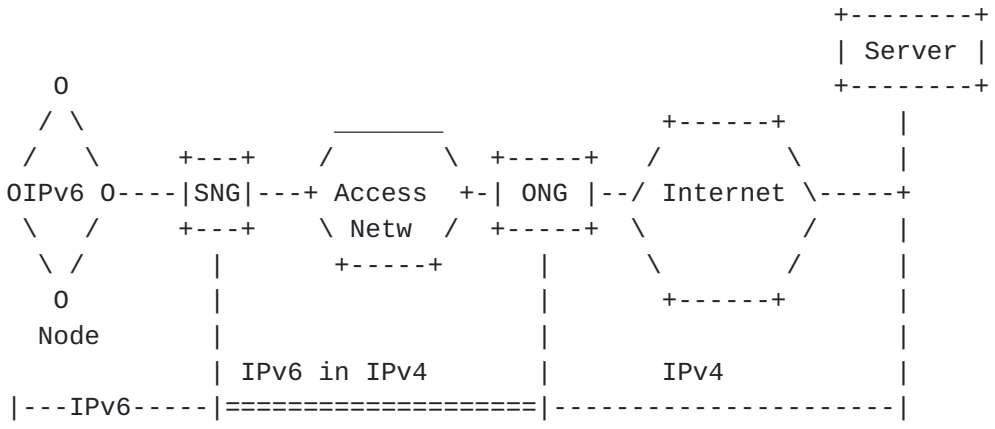

Figure 3: Translation on ONG

In Figure 4, different from the above scenario, the SNG translates the IPv6 to IPv4 directly, using stateless or stateful translation [I-D.ietf-behave-v6v4-xlate-stateful] [I-D.ietf-behave-v6v4-xlate].

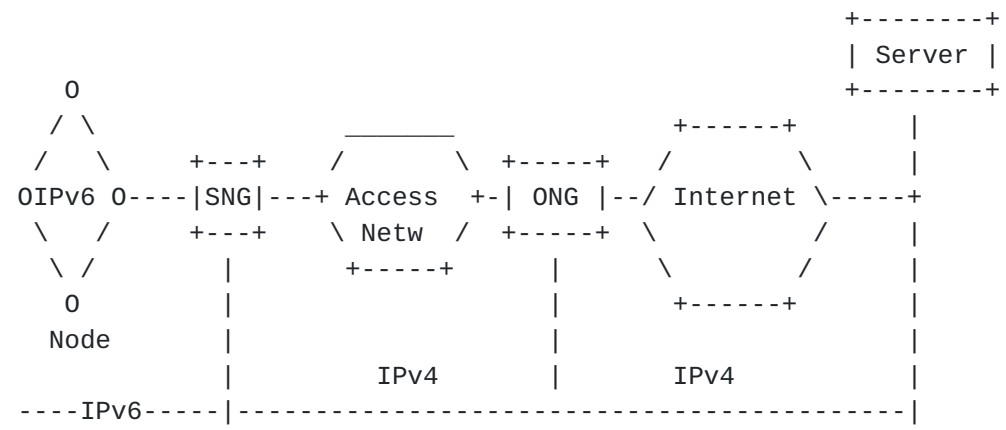

Figure 4: Translation on SNG

4. Security Considerations

TBD.

5. IANA Considerations

This document does not require any IANA actions.

6. Normative References

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