GRASP Prototype

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What is Autonomic Networking?

- “Plug and play for the ISP” or “plug and play for the enterprise”
- The goal is self-management, including self-configuration.
- Nodes will discover information about the surrounding network and negotiate parameter settings with other nodes.
- Humans will set general policy intent.

What is GRASP?

- GeneRic Autonomic Signaling Protocol
- Allows autonomic nodes to discover each other, and mutually negotiate or synchronize parameters.
- The “customers” for GRASP are Autonomic Service Agents (ASAs) – the “apps” of autonomic networking

What is a GRASP Objective?

- A configurable parameter:
  - a logical, numerical or string value, or a more complex data structure.
  - used in Discovery, Negotiation and Synchronization.
- Example for IPv6 prefix management:
  `["PrefixManager", flags, loop_count, [PD_support, prefix_length, prefix]]`

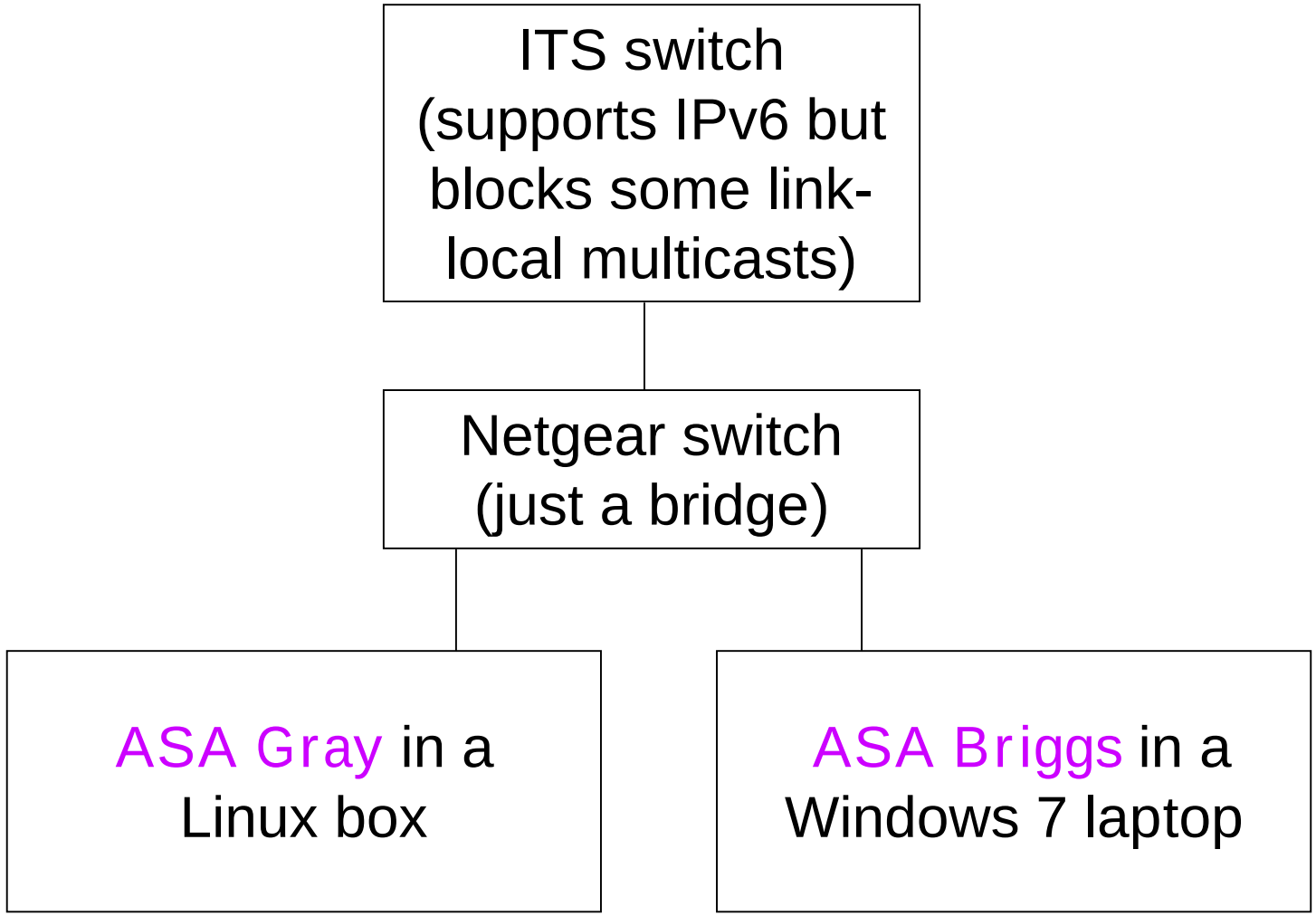
GRASP messages

- Discovery (multicast)
  Discovery Response
- Request Synchronization
  Synchronization
- Flood Synchronization (multicast)
- Request Negotiation
  Negotiation
  Confirm Waiting
  Negotiation End

Python prototype

- A Python 3 implementation of GRASP as a module **`grasp.py`**
  - About 1400 lines of code
- A test suite to exercise as many code paths as possible, **`grasptests.py`**
- Vaious toy ASAs to test “real” operation across the network, e.g. **`Briggs.py`** and **`Gray.py`**
- Some documentation

Tests


ITS switch
(supports IPv6 but blocks some link-local multicasts)
Netgear switch
(just a bridge)
ASA Gray in a Linux box
ASA Briggs in a Windows 7 laptop

Sample logs

```
GRASP startup thread exiting
ASA Gray is starting up
...
Asking for $  129
Discovered locator
    2406:e007:477e:1:28cc:dc4c:9703:6781
Sending req_negotiate to
    2406:e007:477e:1:28cc:dc4c:9703:6781
Assembled Python message  [3, 2706907,
    ['EX3', 1, 5, ['NZD', 129]]]
```

```
negloop: CBOR->Python:  [4, 2706907,
    ['EX3', 1, 4, ['NZD', 118]]]
negloop: got NEGOTIATE
Assembled Python message  [5, 2706907,
    [101]]
Negotiation succeeded  ['NZD', 118]
```

```
GRASP startup thread exiting
ASA Briggs is starting up
...
listen_negotiate: Waiting for a
    negotiate request
```

```
Received request: CBOR->Python:  [3,
    2706907, ['EX3', 1, 5, ['NZD',
    129]]]
Request queued for ASA
listen_negotiate: Got negotiate request
    from queue
listened, answer  EX3  ['NZD', 129]
Assembled Python message  [4, 2706907,
    ['EX3', 1, 4, ['NZD', 118]]]
```

```
negloop: CBOR->Python:  [5, 2706907,
    [101]]
Negotiate_step: got END
```

Further reading

- RFC 7575
- RFC 7576
- https://datatracker.ietf.org/wg/anima/documents/
- https://www.cs.auckland.ac.nz/~brian/graspy/