A Reference Model for Autonomic Networking

draft-behringer-anima-reference-model-03.txt

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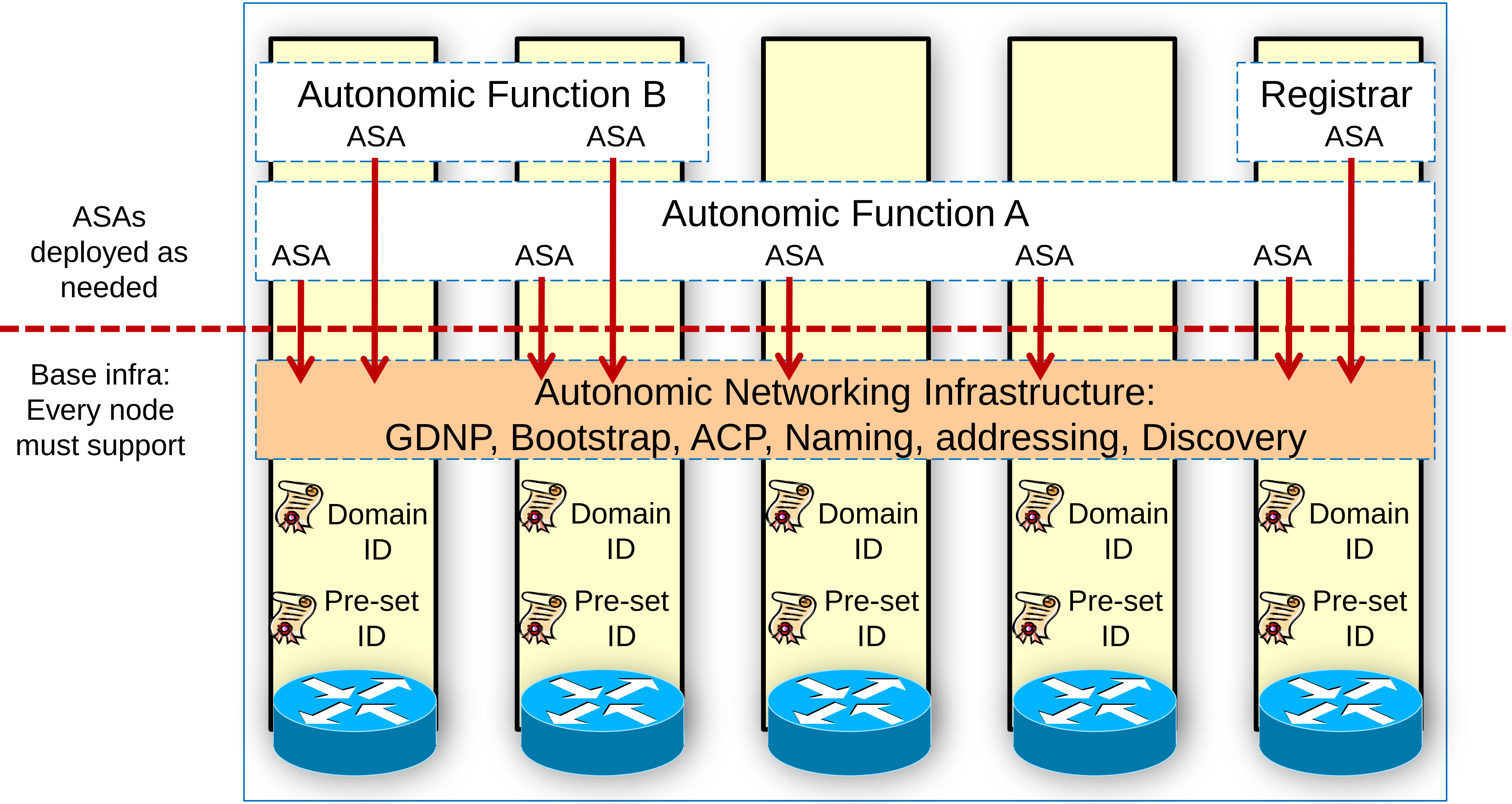
Reference Model – High Level View



Network with autonomic functions

draft-behringer-anima-reference-model-03.txt

- Moved MASA to “trust infrastructure”, and registrar to “ASA” section.
- Introduced constrained node

- Naming: New section, needs discussion and review

- Addressing: Merged the addressing draft here, with some changes. Needs more discussion and review.

- Discovery, signalling and intent distribution have new text, needs review.

- Points to ACP draft. Should probably have more explanation here.

- Ordered several “loose” bits into this section.

draft-behringer-anima-reference-model-03.txt

- Clearly separate ASA from infrastructure now.
- New section on ASAs
- The registrar is now covered here, since it is an ASA

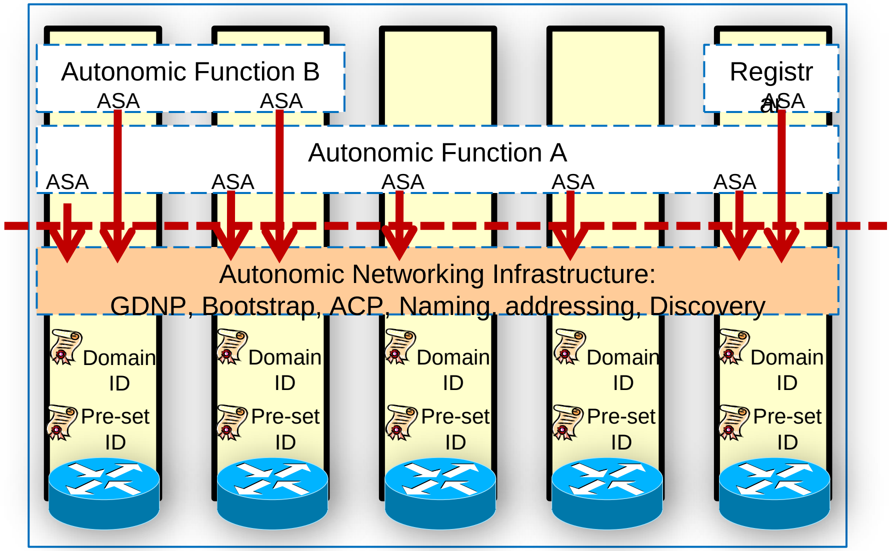
- New section, collecting some previously loose bits, and some new content. Needs reviews – how much detail do we want to put in here?

- New section about interactions of autonomic functions. More long term, but highly relevant.

- Needs more work.

Document Structure

- **Structure of the document becoming stable**
- **No major issues with the structure itself**



Network with autonomic functions

Naming

- Why names?
  - As an identity
  - As a subject name in the autonomic certificate
- Structured names:
  - Ex: Location-DeviceType-FunctionalRole-DistinguisherNumber@NameofDomain
  - Use self-knowledge for part of the name (e.g., device type)
  - Use other mechanisms (intent) for other parts (e.g., domain)
- Open questions:
  - Should we support assigned names, automatically created names, or both?
  - If automatic, how do we assign the names?

Addressing – Where to Cover?

- Used to be a separate draft (draft-behringer-autonomic-addressing)
- But, this draft is not a standalone chartered item
- Request from WG chair was to integrate with an existing document
- Currently put the entire addressing doc into the reference draft.
  - Is this the right place? (for addressing schemes?)
- Possible way forward:
  - Leave requirements and concepts in reference draft
  - Put the addressing schemes into … ? ACP draft?

Addressing - Scope

- **In scope: Addressing used by the Autonomic Networking Infrastructure (and indirectly by Autonomic Service Agents) inside an autonomic domain.**
- **Not in scope: Addressing of the data plane, i.e. anything that is used for services to customers.**
- **An autonomic function could negotiate address space for the data plane, for example draft-jiang-auto-addr-management.**
  - **The function *uses* autonomic address space**
  - **But it *assigns and manages* data plane address space**

- Is that sufficiently clear?

Addressing – Various points

- An Autonomic Node gets an address.
  - ASAs do NOT get addresses.
  - Autonomic nodes multiplex ASAs.
- Non-autonomic nodes do not get autonomic address

Addressing - Requirements

- **Zero-touch for simple networks**
- **Low-touch for complex networks**
- **Flexibility (allow for growth, splits, merges, etc)**
- **Robustness (admin can’t mess up)**
- **Support for virtualization**
- **Simplicity**
- **Scale**
- **Upgradability**

- We do NOT want to require an admin to maintain an address scheme.
- At worst: Assign a prefix to network or a zone.

Addressing - Concepts

- **IPv6 only (for the autonomic mechanisms)**
- **Usage: For autonomic functions exclusively**
- **Separation (from user address space)**
- **Overlay network**
- **Use ULA, on virtual interfaces**
- **No link addressing, only link local**
- **No external connectivity**

- No consensus here yet: request was to allow IPv4 as well.

- All other points seem to have consensus?

Addressing – Base Scheme

- **Base Scheme:**

```
 8      40          3                     77
+--+--------------+------+-------------------------------------------+
|FD| hash(domain) | Type |              (sub-scheme)                 |
+--+--------------+------+-------------------------------------------+
```

- **Hash(domain) provides pseudo-random prefix, as required by RFC4193 (ULA)**
- **We suggest a type field, to allow different address schemes in the future.**
- **Idea: Standardize only one type initially.**

- Do we agree so far?
- Comments? Concerns?

Addressing – Sub-Scheme 1

- Needs discussion

- Sub-Scheme 1:

```
          51                 13                    64
+------------------------+---------+---------------------------------+
|    (base scheme)       | Zone ID |         Device ID               |
+------------------------+---------+---------------------------------+
```

- Registrar assigns device ID
  - It is unique for a device in a domain
  - It does NOT specify a locator, but an identifier
  - Device ID does not change in the lifetime of a device
- Zone-ID initially zero.
  - When aggregation is required, use a zone-ID <> 0

Addressing – Sub-Scheme 2

- **Sub-Scheme 2:**

```
          51                13                    64-V           ?
+------------------------+---------+----------------------------+---+
|    (base scheme)       | Zone ID |        Device ID           | V |
+------------------------+---------+----------------------------+---+
```

- **Add “Virtualisation” bits at the end**
  - **Allow addressing various virtual machines on a single node**
- **Keep routing simpler:**
  - **Node announces not a /128, but for example /127**

- Needs discussion

Discovery, Signaling, Intent Distribution

- **Overall goal: Minimise northbound interfaces. Thus:**
- **Discovery needed for discovering:**
  - **Nodes**
  - **Services**
- **Signalling needed to negotiate between nodes, synchronise, etc.**
- **Intent distribution should also be horizontal**

- **All these could be covered with a single protocol**
  - **Candidate protocol: draft-carpenter-anima-gdn-protocol**

- Needs discussion

Routing and ACP

- (covered in the ACP discussion)

Security and Trust Infrastructure

- **Premise: “Self-protection”**
  - **Autonomic functions do not require configuration to be secure. They are designed and negotiated securely.**
- **Use a domain based PKI**
  - **Domain has a CA**
  - **The registrar(s) are RAs**
  - **MASA server allows for vendor certification.**

- Section needs work, but I believe the fundamental concepts are mostly agreed.

Management Section

- Generally “self-management”.
- Admin guidance through Intent
- Coexistence with existing methods (NETCONF, SNMP, SSH, etc)
- Conflict resolution
- Aggregated reporting
- Feedback loops to NOC
- Control loops
- APIs

- Mostly new content.
- Needs discussion

Coordination between Autonomic Functions

- **Autonomic functions may interact:**
  - **Dependency, conflict, cooperation**
- **Various ways to deal with interactions, at various times:**
  - **Build time**
  - **Deploy time**
  - **Run time**
- **Require a coordination function**

Summary

- Structure getting solid
- Content still needs work
- Open, high level question: How much detail, how much forward looking items (to be seen over time)

- Adoption as WG document?