A Reference Model for Autonomic Networking

draft-behringer-anima-reference-model-00.txt

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Background

• History
  – A Framework for Autonomic Networking Jun 2012
draft-behringer-autonomic-network-framework-00.txt
  – Bar Bof @ IETF (Berlin) Jul 2013
  – Autonomic Networking - Definitions and Design Goals Dec 2013
draft-irtf-nmrg-autonomic-network-definitions-00.txt

• Goal of this document:
  – “Define how the various elements in an autonomic context work together, to describe their interfaces and relations.”
This is the MUST implement for an “autonomic node”
Likely: two variants for “core” and “constrained” nodes.

Base infra: Every node must support

Autonomic Networking Infrastructure:
GDNP, Bootstrap, ACP, Naming, addressing, Discovery

Network with autonomic functions
Functional Model: Autonomic Functions

Autonomic Networking Infrastructure:
- GDNP
- Bootstrap
- ACP
- Naming
- Addressing
- Discovery

Base infra: Every node must support
- Pre-set ID
- Domain ID

Autonomic Functions deployed as needed

Autonomic Functions are implemented over several nodes.
**Autonomic Service Agent (ASA):** A local instantiation of an Autonomic Function.
Functional Model: Conceptual API (Basic)

Autonomic Networking Infrastructure:
GDNP, Bootstrap, ACP, Naming, addressing, Discovery

Autonomic Function B
ASA
ASA

Autonomic Function A
ASA
ASA
ASA
ASA
ASA

Registrar
ASA

ASAs deployed as needed

Base infra: Every node must support

Domain ID

Domain ID

Domain ID

Domain ID

Domain ID

Pre-set ID

Pre-set ID

Conceptual API

Basic API Examples: (Treat ACP as a “network”)
- “Which address belongs to node x?” (“arp”)
- “Send packet to node x”
- …

Network with autonomic functions
Functional Model: Conceptual API (Basic)

Base infra: Every node must support
ASAs deployed as needed

In a basic model, ASA communicate with each other.
Any type of communication possible:
- Unicast
- Multicast
- Also between ASAs on the same node

Network with autonomic functions

Autonomic Networking Infrastructure:
GDNP, Bootstrap, ACP, Naming, addressing, Discovery

Autonomic Function A
ASA
ASA
ASA
ASA
ASA
ASA
ASA
ASA
ASA

Autonomic Function B
ASA
ASA
ASA
ASA
ASA
ASA
ASA
ASA
ASA

Registrar
ASA

Domain ID
Pre-set ID
Domain ID
Pre-set ID
Domain ID
Pre-set ID

Functional Model: Conceptual API (Advanced)

Autonomic Function B
ASA
ASA

Autonomic Function A
ASA
ASA
ASA
ASA
ASA

Registrar
ASA

Conceptual API

Autonomic Networking Infrastructure:
GDNP, Bootstrap, ACP, Naming, addressing, Discovery

ASAs deployed as needed

Base infra: Every node must support

Advanced API Examples: (Treat ACP as a “service”)
- “Send message to node x”
- “Send message to all edge routers”
- “Negotiate parameter x with node y”
- “Where is the Registrar?”
- “Tell me about events that concern call managers”

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Things to Address

• Autonomic Service Agent (ASA):
  – How does an ASA use services of the ANI? APIs, etc.
    • API versus direct access. API should be at least conceptually clear.
    • Idea: If you don’t use the APIs, you can’t call yourself an ASA.
  – How an ASA uses ACP and data plane services

• Management of an Autonomic Network
  – How intent is created, ingested, propagated
  – Feedback loops to NMS / operator

• No protocols in this document (make explicit)
Things to Address

• Capabilities between ASAs.
• Support more than one security level
  – Ex: Sensors may not be able to support X.509 certificates
• Support more than one capability level
  – Ex: Core nodes and edge nodes
• Do we want combined discovery and negotiation, or separate protocols?
  – Combined is more efficient, faster
  – Separate is more modular
Next Steps

• What are we missing? Comments?
• Contributors: Who wants to contribute to the document?
• Next version of doc before next IETF.
• Keep document as concise as possible
• Goal:
  – Adoption as WG document
  – Informational RFC