

An Autonomic Control Plane

draft-behringer-anima-autonomic-control-plane-00.txt

91th IETF, 10 Nov 2014

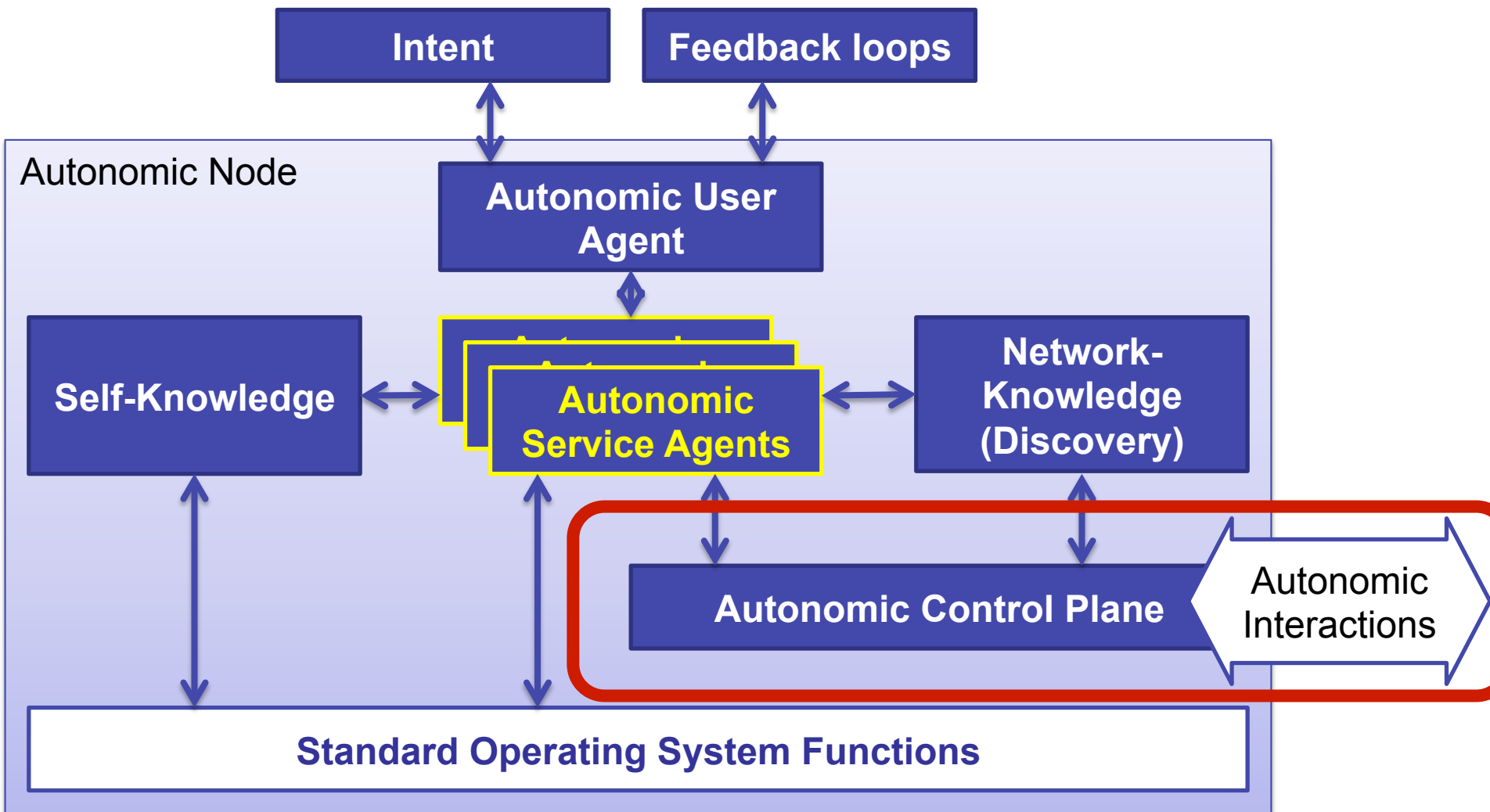
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Reference Model of an Autonomic Node



The Autonomic Control Plane

- **Definition: The conjunction of protocols and interactions between autonomic service agents on nodes and registrars.**
 - Includes: Discovery, negotiation, messaging, etc.
- **Four options (from draft-irtf-nmrg-autonomic-network-definitions):**
 - Inband: Like today's control plane protocols
 - Out of band: On a separate DCN
 - In a configured overlay network (VPN)
 - In a self-managing overlay network (VPN) ← Main focus today

Self-Creation of the Autonomic Control Plane

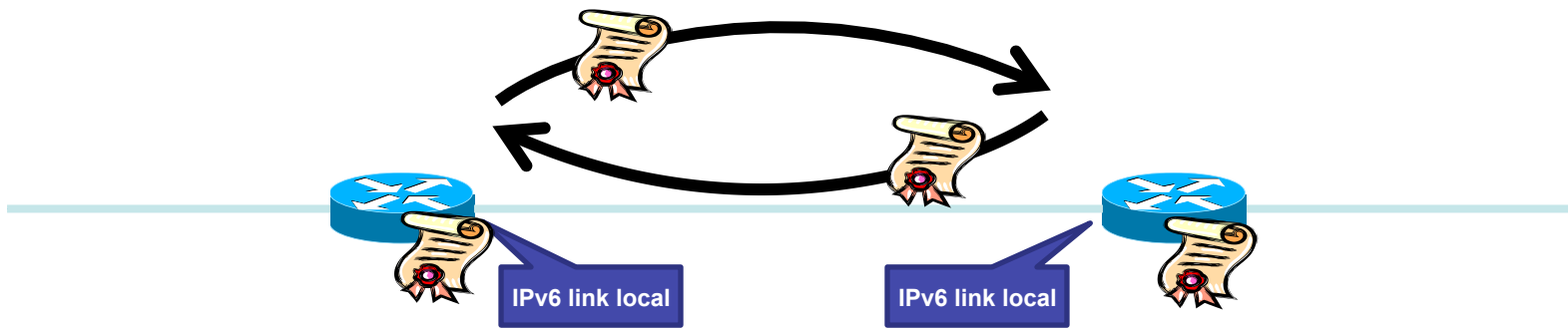
1) Preconditions



- **Each node must have a domain certificate**
 - Or other way to authenticate other nodes

Self-Creation of the Autonomic Control Plane

2) Adjacency Discovery

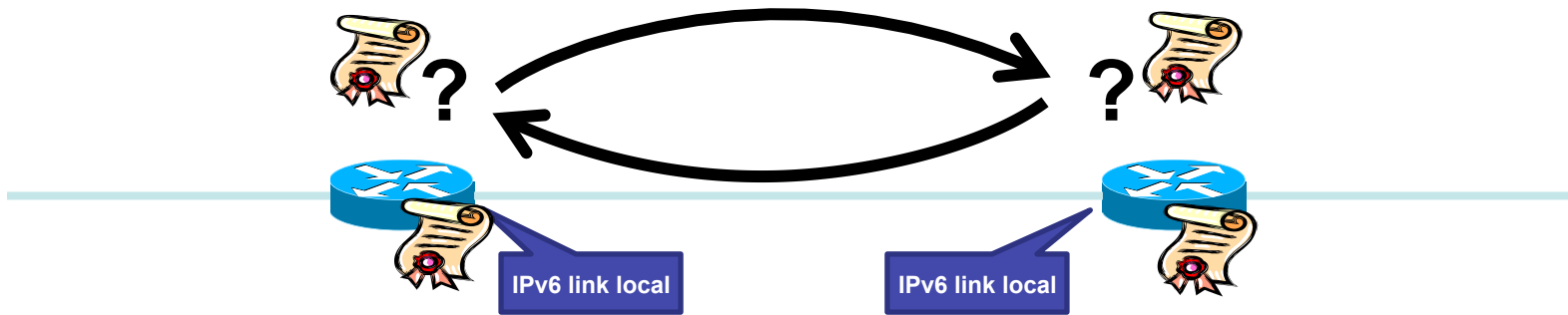


- Nodes discover each other
- Exchange their identities
- Use IPv6 link local
 - No dependency on configuration or routing!



Self-Creation of the Autonomic Control Plane

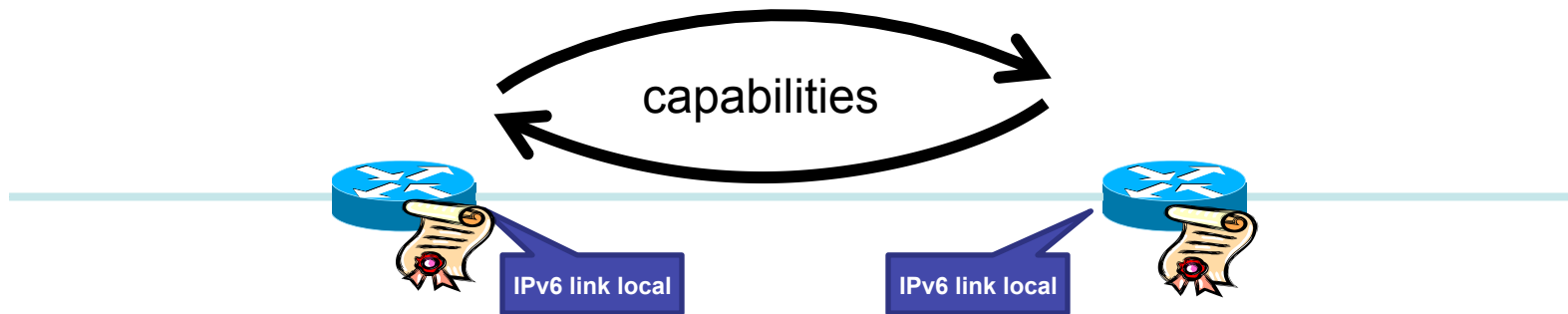
3) Authentication



- Nodes validates certificate of adjacent node

Self-Creation of the Autonomic Control Plane

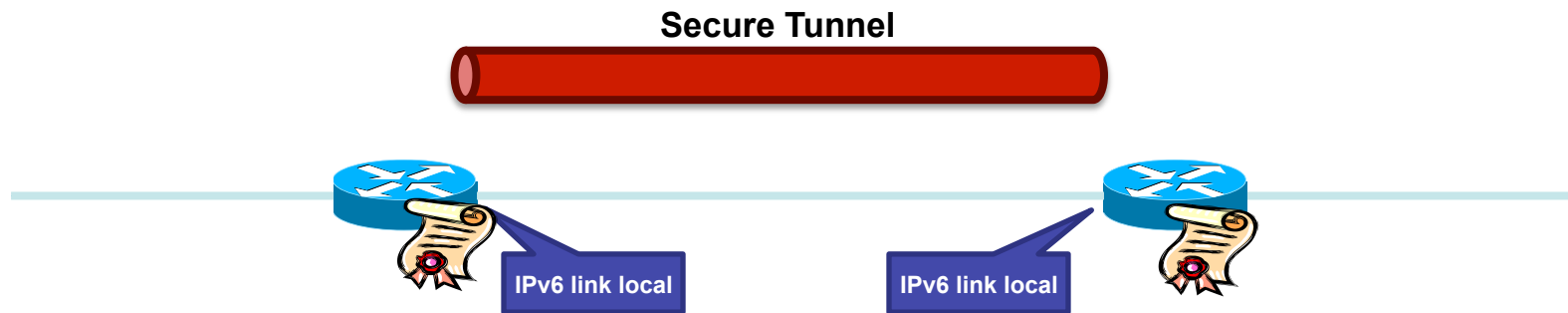
4) Capability Negotiation



- **Negotiation of:**
 - Tunnel type supported; ex: **GRE/IPsec**
 - Other parameters

Self-Creation of the Autonomic Control Plane

5) Channel Establishment

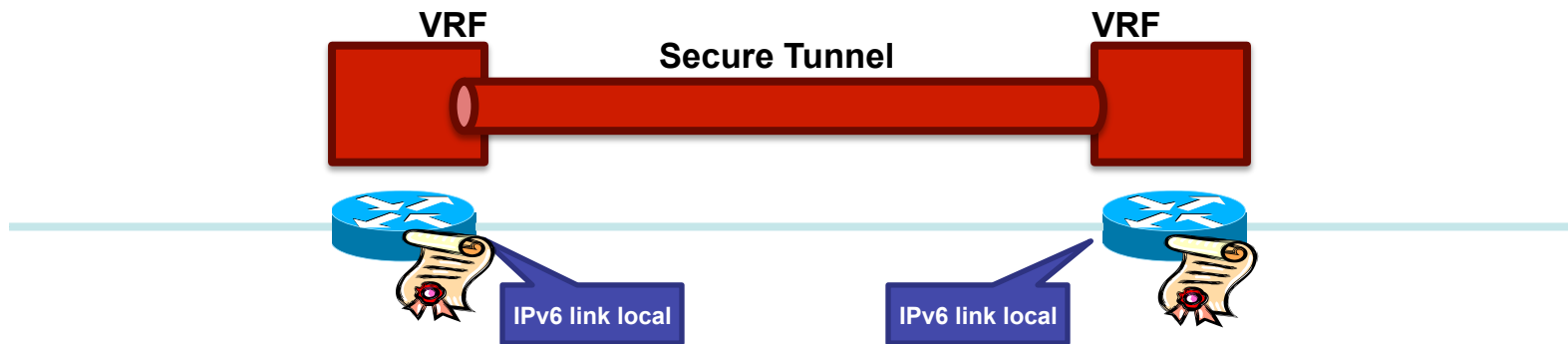


- Establish secure channel
- Based on IPv6 link local
 - No dependency on configuration or routing!



Self-Creation of the Autonomic Control Plane

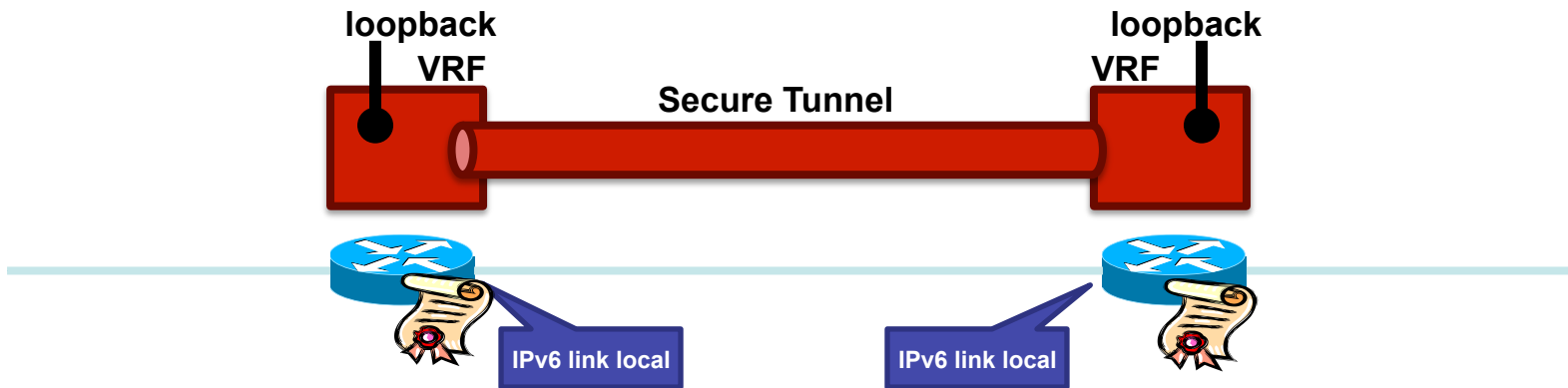
5) Context Separation



- Auto-create VRF
- Insert tunnel into VRF

Self-Creation of the Autonomic Control Plane

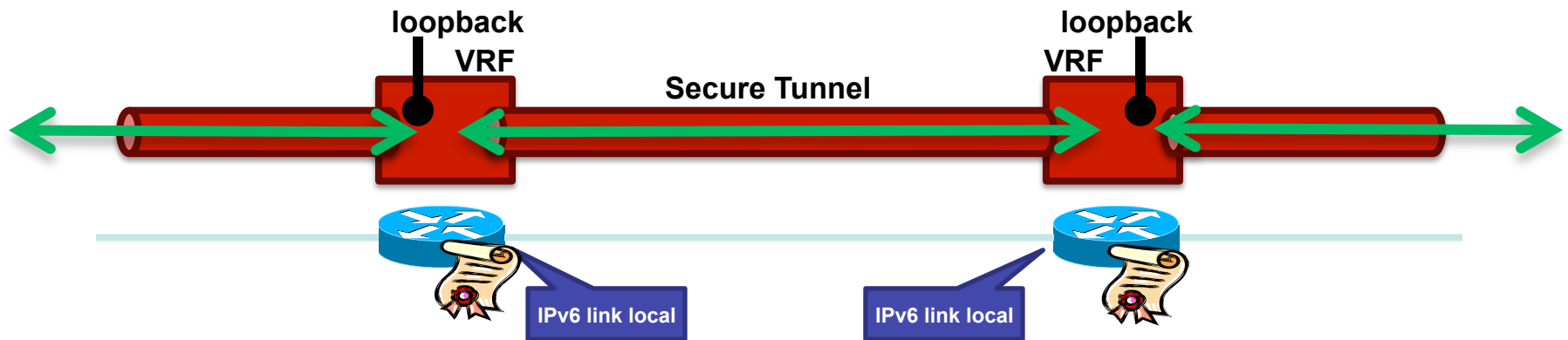
6) Addressing



- **Auto-create IPv6 loopback address**
- **Suggestion: Use IPv6 ULA**
 - Global ID: Hash of domain name
 - Subnet and interface ID: Device specific, unique in network
 - Derive from device name, or
 - Assign at time of first registration of device

Self-Creation of the Autonomic Control Plane

7) Routing



- **Routing inside the ACP to distribute loopbacks**
- **Automatic**
- **Routing protocol must be scalable and light-weight**
 - Should not cause undue load on devices
 - We suggest RPL

Properties of the Autonomic Control Plane (self-managing overlay)

- **Self-Creating**
- **Self-Managing**
- **Self-Healing**
- **Self-Optimising**
- **Self-Protecting**

The Autonomic Control Plane is autonomic itself!

Use Cases:

- **Bootstrapping an un-configured network**
- **Virtual Out Of Band Channel**
 - **ACP not dependent on configuration, addressing, routing**



Relationship with other IETF activities

- **The self-managing ACP could be used in other contexts, but not mandatory.**
 - **Ex: Homenet**

Next Steps

- **Clarify the four ACP options**
 - (inband, out of band, configured overlay, autonomic overlay)
- **Include feedback from Rene Struik**
- **Include feedback from Brian Carpenter:**
 - **Partitioning and Merging**
 - **Merging previously unrelated networks**

- **Is this useful?**