A Filter Rule Mechanism for Multi-access Mobility

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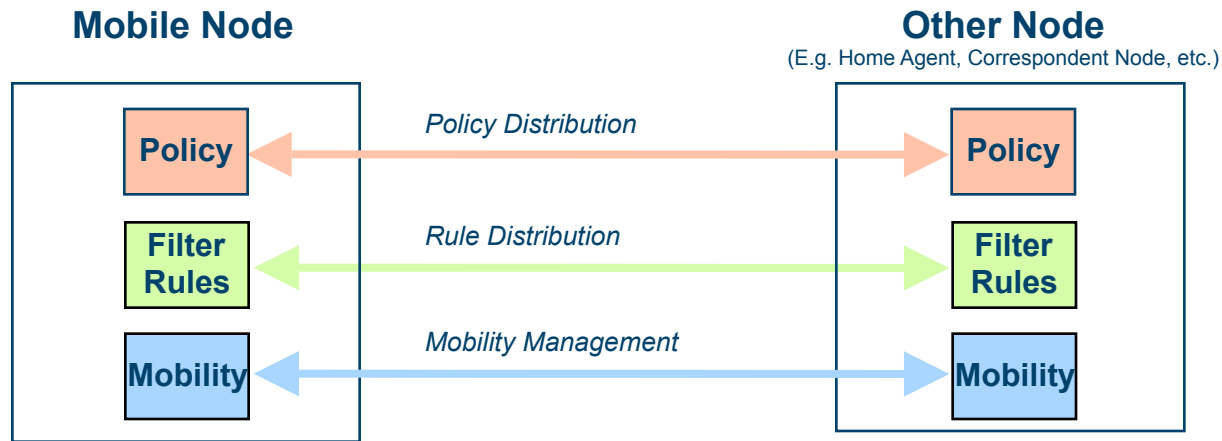
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Multi-Access Mobility Filter Rules
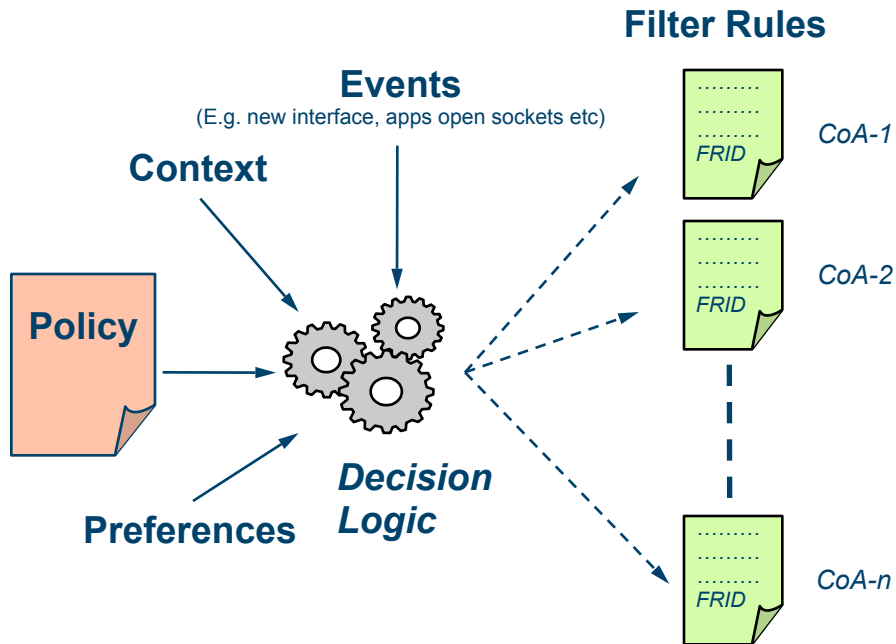## Architecture Overview

Mobile Node

Other Node
(E.g. Home Agent, Correspondent Node, etc.)

Policy	← *Policy Distribution* →	Policy
Filter Rules	← *Rule Distribution* →	Filter Rules
Mobility	← *Mobility Management* →	Mobility

- Policies and filter rules are distributed by separate means compared to mobility management signalling.
- This means that policies and filter rules can be installed at any point in time, and especially at the launch of applications and discovery of new access types (and independent of possible handovers)
- Mobility Management signalling is used to bind and rebind filter rules to the recipient locator (i.e. care-of address).
- Multi-access filter rules may be useful not only for MIP (MONAMI6) but also for HIP and possibly SHIM6 and other protocols.

2005-05-18

Multi-Access Mobility Filter Rules
Policy

Filter Rules

Events
(E.g. new interface, apps open sockets etc)

Context

Policy

Preferences

Decision Logic

FRID — *CoA-1*

FRID — *CoA-2*

FRID — *CoA-n*

- Policies can be defined by both the mobile node and the network side.

- Policies are described in an abstract high level "language" and influence for instance which interface to use given the current state of the node.

- When an event occurs the policies etc. are processed in Decision Logic and the following actions can be the result:
  - updating binding of Filter Rule to CoA (via BID)
  - creation, modification and deletion of filter rules

- Policies could either be pre-installed in the nodes or distributed dynamically in runtime.

- Policies are generally asymmetric.
  - I.e. two communicating nodes do not need to have the same set of policies.

Multi-Access Mobility Filter Rules

Filter, filter rules and flows

- A filter consists of a set of filter rules.

- Filter rules:
  - Each filter rule is identified by an identifier, i.e. a filter rule identifier (FRID).
  - Filter rules are described using the packet filter (PF) format.
  - A filter rule operates on individual packets, and is used to capture the notion of generalised flows.
  - Filter rules may be defined by both the mobile node and the network side.
  - Filter rules could either be static (i.e. pre-configured) or dynamically defined, e.g. when an application opens a socket.
  - Applications can dynamically define filter rules for a specific traffic flow.
  - In case of conflicting filter rules from mobile node and network sides, conflict resolution must be provided by appropriate policies

2005-05-18
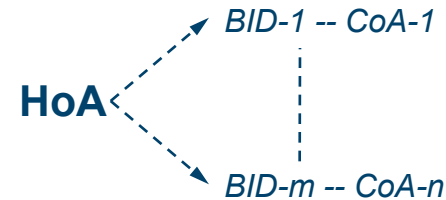
Multi-Access Mobility Filter Rules

Filter, filter rules and flows

- Transport of Filter Rules between the involved nodes.
  - Filter rules could be installed at any point in time.
  - The protocol used to distribute the filter rules could be HTTP, UDP...
  - The mechanism must be bi-directional, i.e. both involved nodes must be able to modify the filter rules.
  - There must be mechanisms to add, remove, update filter rules.
- Filter rules and Interfaces
  - A filter rule is associated with one BID, which is associated with one IP-address
- Relation between flow and filter rules
  - A flow is traditionally defined by the 5-tuple <srcAddr,dstAddr, srcPort, dstPort, Proto>

  However:
  - Since a filter rule operates on individual packets, there is no clear relationship between the flow concept and the rule concept, there might be a one-to-many or many-to-one relationship between flows and rules.

Multi-Access Mobility Filter Rules
Binding between filter rule and BID

- The Binding Identifier (BID) enables multiple care-of addresses to be associated simultaneously with the same HoA, i.e. the BID is used to distinguish between the bindings corresponding to the same HoA.

- The FRID could be used, as a level of indirection, to refer to the care-of address.

- By extending the BID-option to include one or multiple FRID(s) a binding between the BID and a set of FRIDs would be achieved.

- When sending a BU to change the CoA it would be enough to send the BID and associated new CoA. This would make all FRIDs associated with the BID to be associated with a new CoA.

BID-1 -- CoA-1

HoA

BID-m -- CoA-n

Binding Update
BU {BID-option (BID-1, CoA-1, [FRID-1, …])
      BID-option (BID-2, CoA-2, [FRID-2, …])}
Binding Update
BU {BID-option (BID-1, CoA-3)}

Multi-Access Mobility Filter Rules

What we originally wanted to put into -00, but omitted due to time...

- A filter rule definition language
  - Shamelessly borrowed from PF, OpenBSD's Packet Filter (This makes it similar to draft-mitsuya-..., but we propose to use plain text pf rules, rather than XML encapsulation)
- A filter rule transfer mechanism
  - Probably http:// based, but any transport that can carry plain ascii text with some meta-information can be used.
- A specification of how FRIDs are bound to BIDs
  - first for MONAMI6
  - also a binding specification for HIP
  - maybe later for SHIM6?