Updates: Information Distribution in Autonomic Networking
(draft-liu-anima-grasp-distribution-06)

Bing Liu, Xun Xiao, Sheng Jiang, Artur Hecker
@Anima WG, ietf102, July 2018
Reminder

• Information distribution is a function to handle different patterns of information exchange between autonomic nodes
  – using GRASP as bearing protocol

• In IETF101, we mainly discussed general patterns and requirements of information distribution mechanism
  – Instant distribution (Synchronous)
    • Point-to-Point
    • Flooding
    • Selective Flooding
  – Asynchronous distribution
    • Sub/Pub
    • Event Queue (mostly handled within a node)
    • Distributed Storage (mostly handled within a node)
Changes since IETF101

- 06 version made some essential changes
  - Including some real use cases where advanced information distribution mechanisms are needed (from 3GPP and 5GAA)
  - Extending GRASP to achieve the distribution mechanisms
Use case 1:
Network Function entity communications in 5G

- Mode 1: “An NF can directly communicate with another NF”
  - Mapping to: P2P Instant Negotiation/Synchronization between ASAs
- Mode 2: “An NF can subscribe events from another NF”
  - Mapping to: Sub/Pub between ASAs
- Examples: NF Service Status Subscribe/Notify

Ref: 3GPP TS23.502, “Procedures for 5G Systems (Rel. 15)”, 2018-06
Use Case 2: Network Exposure Function (NEF) in 5G

- The network capability exposure comprises [Ref: 3GPP TS23.502, Sec. 4.15]:
  - Exposure of network events externally as well as internally towards core network NFs;
  - Exposure of provisioning capability towards external functions;
  - Exposure of policy and charging capabilities towards external functions;
  - Exposure of core network internal capabilities for analytics.

Fig. 4.2.3-5, 3GPP TS23.501
Use Case 3: User Data Repository (UDR) in 5G

- 5G service-based architecture (SBA) requires ‘stateless’ NFs
  - All CP/UP data should be stored out of the NF
- UDR supports the following functions:
  - Storage and retrieval of subscription data by the UDM;
  - Storage and retrieval of policy data by the PCF;
  - Storage and retrieval of structured data for exposure;
  - Application data (including Packet Flow Descriptions (PFDs) for application detection, AF request information for multiple UEs), by the NEF;
- Multiple instances of UDR may be deployed, each one storing specific data or providing service to a specific set of NF consumers

Ref: 3GPP TS23.501, “Procedures for 5G Systems (Rel. 15)”, 2018-06
Ref: 3GPP TS23.502, “Procedures for 5G Systems (Rel. 15)”, 2018-06
Use Case 4: 5GAA Vehicle-to-Everything (V2X)

• Sample use cases:

<table>
<thead>
<tr>
<th>Use Case Name</th>
<th>Description</th>
<th>Mapping to ANIMA Info.-Dist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software/Firmware Update</td>
<td>Provides mechanism for vehicles to receive the latest software updates</td>
<td>• Pub/Sub</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Negotiation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bulk transfer (GRASP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Distributed Storage (@Edge)</td>
</tr>
<tr>
<td>Real-time HD Maps</td>
<td>Provides situational awareness for autonomous vehicles at critical road</td>
<td>• Negotiation/Synchronization</td>
</tr>
<tr>
<td></td>
<td>segments in cases of changing road conditions</td>
<td>• Event Queue Prioritization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Distributed Storage (@Edge)</td>
</tr>
</tbody>
</table>
GRASP Extensions (1/5)

• Un-solicited Synchronization Message (A new GRASP Message)

unsolicited_synch-message = [M_UNSOLDSYNCH, session-id, objective]

A node MAY actively send a unicast Un-solicited Synchronization message with the Synchronization data, to another node.
GRASP Extensions (2/5)

• Selective Flooding Option

selective-flood-option = [O_SELECTIVE_FLOOD, +O_MATCH-CONDITION, 
match-object, action]

O_MATCH-CONDITION = [O_MATCH-CONDITION, Obj1, match-rule, Obj2]

  Obj1 = text
  match-rule = GREATER / LESS / WITHIN / CONTAIN
  Obj2 = text
  match-object = NEIGHBOR / SELF
  action = FORWARD / DROP

The selective flood option encapsulates a match-condition option which represents the conditions regarding to continue or discontinue flood the current message. For the match-condition option, the Obj1 and Obj2 are to objects that need to be compared.
GRASP Extensions (3/5)

• Subscription Objective Option

subscription-objection-option = [SUBSCRIPTION, 2, 2, subobj]
  objective-name = SUBSCRIPTION
  objective-flags = 2
  loop-count = 2
  subobj = text

This option MAY be included in GRASP M_Synchronization, when included, it means this message is for a subscription to a specific object.
GRASP Extensions (4/5)

• Un_Subscription Objective Option

Unsubscribe-objection-option = [UNSUBSCRIB, 2, 2, unsubobj]
  objective-name = SUBSCRIPTION
  objective-flags = 2
  loop-count = 2
  unsubobj = text

This option MAY be included in GRASP M_Synchronization, when included, it means this message is for a un-subscription to a specific object.
• Publishing Objective Option

`publish-objection-option = [PUBLISH, 2, 2, pubobj] objective-name = PUBLISH
objective-flags = 2
loop-count = 2
pubobj = text`

This option MAY be included in GRASP M_Synchronization, when included, it means this message is for a publish of a specific object data.

[Editor's Note]: Detailed node behavior and processing procedures of these new options will be introduced in the next version.
Comments?
Adopted as a new work?

Thank you!

IETF102, Montreal