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 pa tterns of information exchange between autonomic nodes
  - using GRASP as bearing protocol

- In IETF101, we mainly discussed general patterns and requi rements 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 inf ormation distribution mechanisms are needed (fro m 3GPP and 5GAA)
  - Extending GRASP to achieve the distribution mech anisms

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

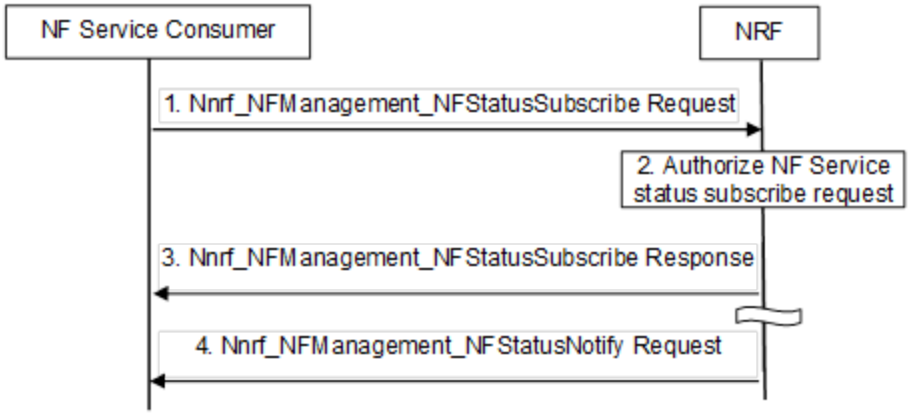
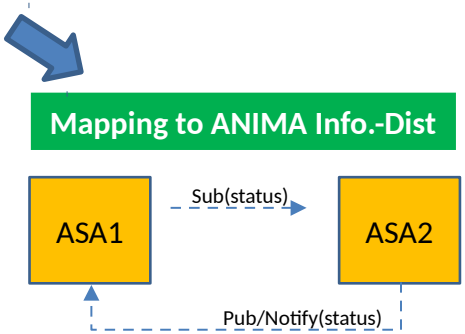


Fig. Procedures of an NF subscribing status from NRF (Fig. 4.17.7.1 in TS23.502)

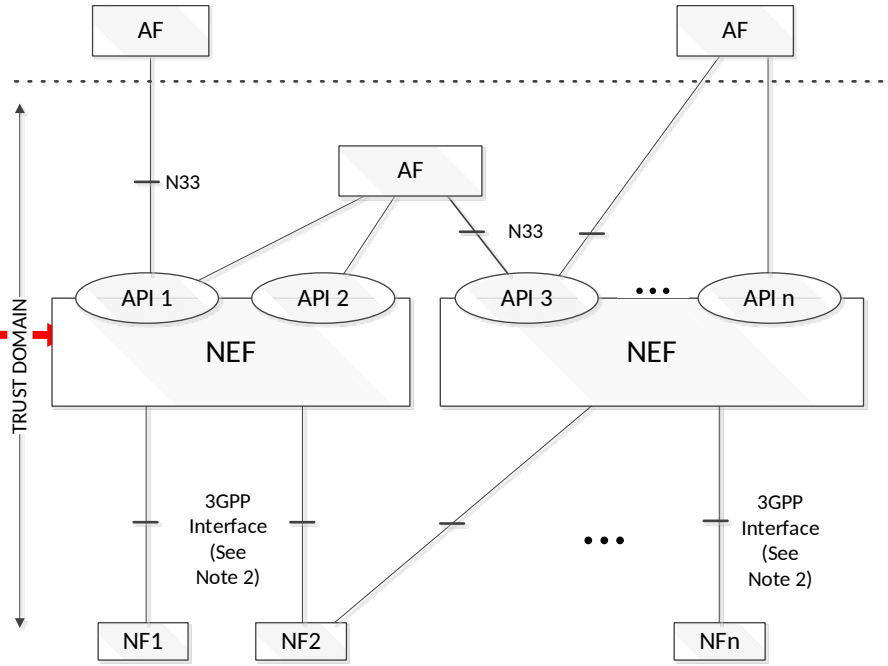


Ref: 3GPP TS23.502, “Procedures for 5G Systems (Rel. 15)”, 2018-06

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.

A distributed function across network nodes *"delegating event queue management"*



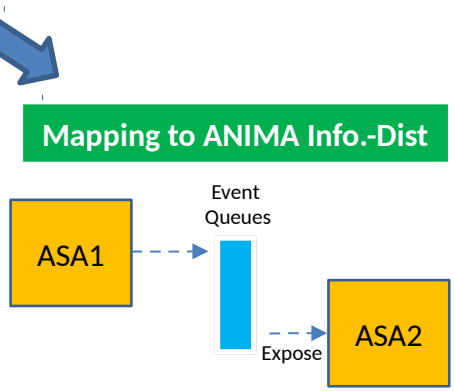
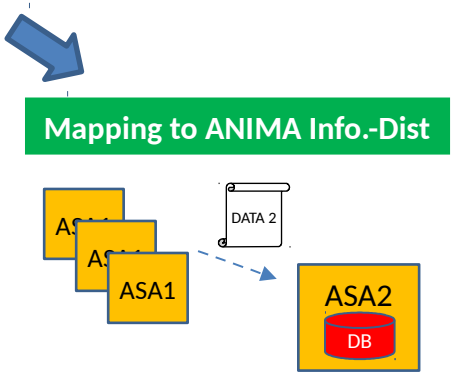


Fig. 4.2.3-5, 3GPP TS23.501

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 req uest information for multiple UEs), by the NEF;
- Multiple instances of UDR may be deployed, each one storing specific data or providin g 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:

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

5GAA Automotive Association

Ref: 5GAA 3GPP Presentation

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 Synchro nization message with the Synchronization data, to ano ther 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 disconti nue flood the current message. For the match-condition option, t he 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 speci fic object.

GRASP Extensions (5/5)

- 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 objec t data.

[Editor's Note]: Detailed node behavior and processing procedure s of these new options will be introduced in the next version.

Comments?
Adopted as a new work?

Thank you!

IETF102, Montreal