The Constrained GRASP(cGRASP)

(draft-ietf-anima-constrained-grasp-01)

Longwei Zhu (Presenter), Sheng Jiang， Cheng Sheng

ANIMA@IETF 123@Madrid

Beijing University of Posts and Telecommunications

Huawei Technologies

cGRASP (History)

- With the rapid development, IoT is urgent for self-management capabilities enabled by GRASP (but is heavy and resource-consuming due to its TCP-based feature).
- The UDP-based and CoAP-based constrained GRASP (cGRASP) has been proposed by draft-zhu-anima-lightweight-grasp00 , -01 , -02 , -03.
- The draft has already been adopted by ANIMA as the draft-ietf-anima-constrained-grasp.
- A lot of discussions and advice were had about the cGRASP during the adoption call.

cGRASP (Major discussions during adoption call)

- What are the typical application scenarios for cGRASP?
  - cGRASP can offer GRASP services for the constrained devices defined in RFC7228 that can not use GRASP (TCP-based), but would be able to use CoAP/UDP.
- Some design details:
  - The reduction from 32 to 16 bits for the session ID should be done carefully, since it will increase the chance of collision.
  - The CBOR-related issues.

cGRASP (Major discussions during adoption call)

- Is CoAP-based cGRASP necessary and practicable?
  - The messaging model of CoAP can be reused, since CoAP has the congestion control and the retransmission mechanism.
  - However, the CoAP “Request/Response” layer and the cGRASP transaction layer can not perfectly match, which is the key challenge to designing CoAP-based cGRASP.
- UDP-based or CoAP-based?

cGRASP (Major discussions during adoption call)

- Is CoAP-based cGRASP necessary and practicable?
- UDP-based or CoAP-based?
  - UDP-based: Inventing a new UDP-based reliable mechanism for GRASP messages will raise all types of questions of validation from WIT CC review, as well as “why re-invent, why not use CoAP”.
  - CoAP-based: It’s challenging to map the cGRASP point-to-point transaction semantics into the CoAP request/response， since the two CoAP sublayers are coupled.

cGRASP (Major discussions during adoption call)

- The CoAP-based cGRASP is required:
  - Define cGRASP simply as an "application" on top of CoAP?
  - Extend CoAP with new CoAP message types that would support cGRASP?
  - A reliable/scoped cGRASP multicast flooding mechanism is required, since CoAP lacks hop-to-hop multicast.

cGRASP (draft-ietf-anima-constrained-grasp-01)

- Clarifies the typical application scenarios of cGRASP.
- Improves the design of cGRASP mechanisms:
  - The length of the session ID remains at 32 bits.
  - All the CBOR-related issues will be checked and corrected.
- Redefines the CoAP-based cGRASP:
  - Defines cGRASP simply as an “application” on top of CoAP.
  - Defines the cGRASP multicast relay.

cGRASP (draft-ietf-anima-constrained-grasp-01)

- Defines cGRASP simply as an “application” on top of CoAP:
  - Defines the well-known URI “grasp-coap” (to be assigned by IANA) to access the cGRASP service over CoAP.
  - Reutilizes confirmable CoAP messages as carriers for reliable cGRASP message distribution, bypassing associated resource processing.
  - Mandates that each cGRASP session over CoAP uses a unique Token for request-response correlation, with strict rules on reuse, retransmission, and duplicate handling.
- Defines the cGRASP multicast relay to expand the multicast scope

cGRASP (draft-ietf-anima-constrained-grasp-01)

- Defines cGRASP simply as an “application” on top of CoAP:
  - Reutilizes confirmable CoAP messages as carriers for reliable cGRASP message distribution, bypassing associated resource processing.
- Defines the cGRASP multicast relay to expand the multicast scope:
  - Given that CoAP lacks the hop-by-hop multicast, the draft defines the cGRASP over CoAP multicast relay with the loop avoidance and rate limit mechanism.

cGRASP(Future work)

- Improve the design of CoAP-based cGRASP:
  - Optimize the cGRASP-over-CoAP application model for better alignment with CoAP.
  - Enhance the scoped/reliable per-hop cGRASP relay forwarding mechanism.
- Conduct necessary PoC experiments to validate and improve cGRASP.
- Develop an open-source prototype of cGRASP in the near future.

THANKS!