



# **The lightweight GRASP**

## **(draft-zhu-anima-lightweight-grasp-00)**

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# Lightweight GRASP (Background)

- With the rapid development, IoT is urgent for self-management
- GRASP is a generic and extensible signaling protocol for self-management in the Autonomic Network, and covers all generic operation behaviors without depending on any specific objectives
  - Discovering on certain objective
  - Synchronizing or flooding information
  - Request and response for information
  - Negotiating for convergence
- Although GRASP is designed for self-management, it is not an ideal choice for the IoT



# Lightweight GRASP (Background)

Although GRASP is designed for self-management, it is not an ideal choice for the IoT

- GRASP is built on TCP and IPv6/IPv4, for resource-constrained devices in the IoT:
  - Both TCP and IPv6/IPv4 are heavy
  - Additional latency, control overhead, and memory consumption caused by complex reliability mechanisms of TCP are inevitable
  - TCP performs badly in the weak network environment, such as un-stable mobile environment, ad hoc networks, etc.



# Lightweight GRASP (Details)

- Shorten the fixed fields:
  - Change the 32-bit session id to 16-bit
  - Change the objective name with indefinite length in the form of a text string to the 8-bit objective number
- Introduce an UDP-based mechanism with an alternative message-oriented built-in reliability mechanism
  - (details are in the next page)

# Lightweight GRASP (Details)

- Introduce a message-oriented built-in reliability mechanism:
  - UDP-based, removes the dependence on TCP
  - Acknowledgment based on the 16-bit number (i.e., Nonce) carried in messages
  - Timeout with retransmission
  - Newly define two options (i.e., the req-ack for acknowledgment request, and the ack option for an acknowledgment, both with a Nonce in) and an ACK message
  - All the unicast messages must be acknowledged, for this, they must carry a req-ack option and can carry zero or more ack options, while the multicast messages are not allowed to carry the req-ack or the ack option



# Lightweight GRASP (Details)

- Discuss the possible IP-dependent method:
  - For the resources-constrained node in IoT, IP connections are not always supported
  - How LW-GRASP adapts to networks without IP: a new Locator option and a new protocol identifier should be selected and defined
  - An example: Exchange LW-GRASP over BLE



# Lightweight GRASP (Discussion)

## ➤ Comments from Brian:

- Some extra specifications to detect repeated messages caused by lost acknowledgment should be added  
**R:** A recipient-side duplicate detection mechanism based on the nonce cache will be supplemented
- Is LW-GRASP relying on the UDP checksum? Is there a negative acknowledgment if there is a checksum error?  
**R:** There is no checksum mechanism in LW-GRASP (to avoid additional complexity), thus it relies on UDP checksum. A negative acknowledgment mechanism will be considered
- Security considerations associated with constrained nodes  
**R:** More security issues concerning constrained nodes and their possible solution will be considered together with the balance of their constrained resources

## ➤ Any other Comments or Questions?

## ➤ Is the ANIMA WG interested in this work?



# THANKS!