

# Autonomic Distributed Troubleshooting

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# Why distributed approach for troubleshooting?

- Challenges of centralized methods
  - Burden of collecting a large amount of data, since there might be too many devices, protocols and data
  - High performance requirements on the Controller/NMS for computing
- User habits
  - It is more convenient/swift for admins to do local configuration and maintenance (e.g. by using CLI interface)
  - Admins need to take time to adapt specific NMS/Controller systems
- A proved efficient approach in some existing examples
  - RSVP-TE PathErr/ResvErr
  - BGP Notification
  - etc.

# What are the possible use cases? (routing related)

## 1) BGP route oscillation

- To send a request message to a router for oscillation source check
- The router responds to indicate whether it is the oscillation source
- Loop the process until identifying the oscillation source

## 2) RSVP-TE set up failure

- The failure device could actively send a notification with cause code to the ingress device

## 3) Peer disconnection (for IGP/BGP/LDP/BFD)

- Device that suffers the disconnection could send a request message
- Device that triggers disconnection send a response with reason of disconnection, including manual shutdown, TCP down and etc.

## 4) Detecting Route Interruption

- To directly fetch up route change history on a router, so that rapid route interruptions can be detected

## 5) BGP Route No-advertise

- Device that suffers from a no-advertise situation could send a request message with the specific IP.
- Receiver will send a response with reason of no-advertise, including egress filters, no-advertise attribute and etc.

## 6) Route Abnormal

- Device could send a request message with the specific IP to another device for abnormal situations
- Receiver will send a response with situation code including "NextHop Unreachable", "Outbound Interface Down", "Suppression" etc.

# What are the possible use cases? (general)

## **7) Management protocol failures**

- Admin could send a request on a neighbor device to the target device, asking for the reason of a login failure on a management protocol, such as SNMP or SSH.

## **8) Collecting other O&M Events**

- Devices could record O&M events, such as: IP-address conflict, memory leak and Etc.
- Certain data could be fetched up on request from a trusted source (e.g. a gateway), so that admins can get those information without checking every single devices.

# How Anima's technologies fit into here?

**Autonomic signaling protocol (i.e. GRASP) could act as an “independent troubleshooting tool” other than the protocols under troubleshooting:**

- If a routing protocol is failed by itself, it very likely cannot advertise the its own maintenance information.
- Restrictions on maintenance mechanisms of the existing protocols
  - If more maintenance mechanisms were introduced, it might have much effect on the current operation, either in performance or complexity.
  - BGP extension of the Path attribute will have influence on the normal routing in parsing and route-selection performance.
  - RSVP extends the cause code for path setup failures. Only two ULONGs are available.
- Protocol extensibility:
  - Error-shooting mechanisms are protocol-specific, we need either make scattered extension in specific routing protocols one by one, or we could converge them into one protocol (e.g. GRASP)

# How Anima's technologies fit into here?

## **Other benefits of this “independent troubleshooting tool”**

- Separates routing and non-routing data
- No additional information on routes, won't affect existing routing system
- More network-wide data accessible for individual device
- Not relying on a centralized server
- Less bandwidth & CPU pressure, comparing to a centralized data collection & analysis mechanism

# General requirements of the protocol

<b>Options Definition &amp; Interaction Process</b>	New options be defined to carry the troubleshooting information regarding to various routing/management protocols.
<b>Message Definition &amp; Interaction Process</b>	Reuse the currently defined messages and procedures of the GRASP protocol and the GRASP-distribution extensions (Pub/Sub, conditional flooding etc.)
<b>Scalability</b>	Lightweight implementation/optimization is needed, to minimize the resource consumption in the devices
<b>Transport</b>	Over UDP is a better choice
<b>Security</b>	Not relying on ACP

# Next Step

- Comments/collaboration are welcomed!

# Thank You!

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