Stressing AMQP

DISCOVERY Project

Rennes Face2Face Meeting

Abdelhadi Chari, Jean-François Peltier
March 30th, 2017

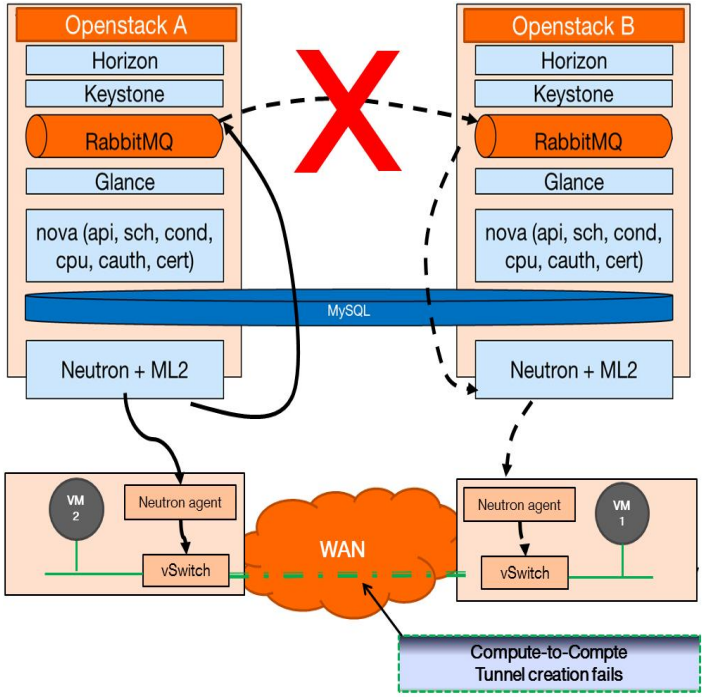
orange™

How to stress AMQP

- OpenStack Internal Communication Bus issue?
- AMQP protocol and RabbitMQ
- AMQP test cases
- AMQP stressor time diagram
- AMQP stressor configuration
- Preliminary results
- Next steps

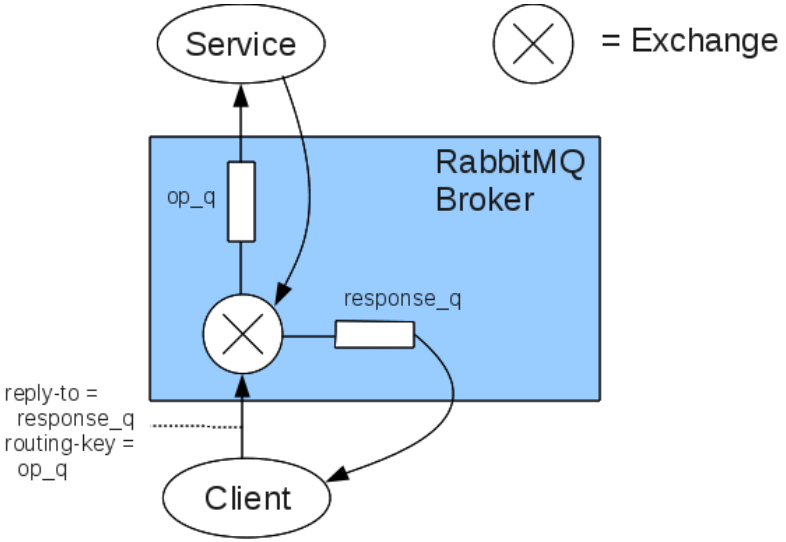
OpenStack Internal Communication Bus issue

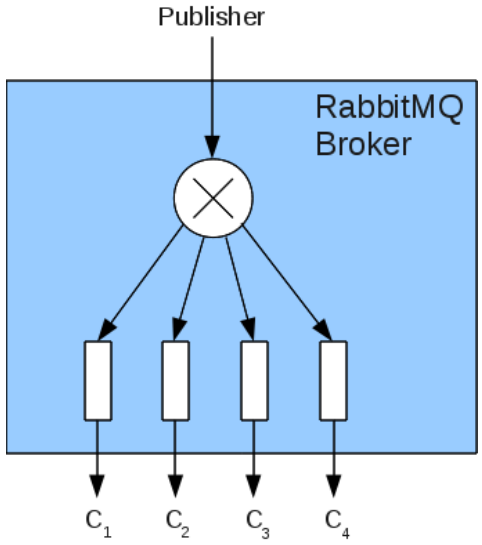
- Today, it is still unclear whether OpenStack internal communication bus (CB) is an issue when using a single OpenStack instance to power a massively distributed cloud
  - In particular, regarding the impact of WAN (delay, packet loss, failure)
- It seems commonly agreed that AMQP does not behave well in a WAN environment, other solutions like Shovel should then be used (WAN-friendly).
- Our goal is to settle this matter



AMQP protocol and RabbitMQ

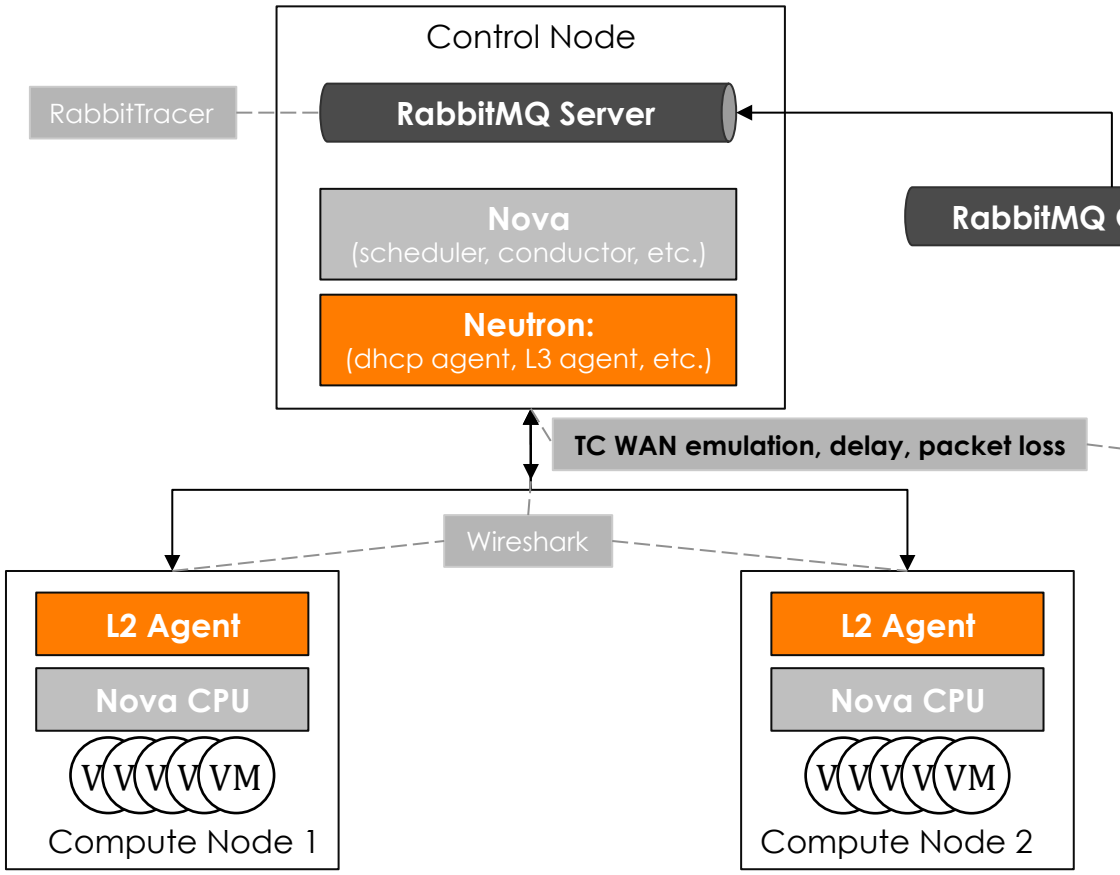
- AMQP stands for Advanced Messaging Queuing Protocol
- AMQP is the messaging technology chosen by OpenStack for internal communication within services
- RabbitMQ is an AMQP message broker
- Exchanges and Queues:
  - Exchanges are set up by services (publisher)
  - Queues are set up by clients (subscribers)
  - They are linked through routing keys
  - Different types of Exchanges:
    - Direct (point to point communication)
    - Topic (to one ore many based on key)
    - Fanout (toward multiple agents)
- Channels
  - AMQP connections are long-lived TCP connections
  - In one TCP connection we can multiplex multiple channels





Our test setup

Setup to emulate whole AMQP traffic generated by 100 compute nodes (heart beats + system messages)



True fake AMQP messages are generated toward Openstack agents

Messages generated are relayed to the agents as normal AMQP messages. This puts stress on Communication bus These messages are ignored by the agents

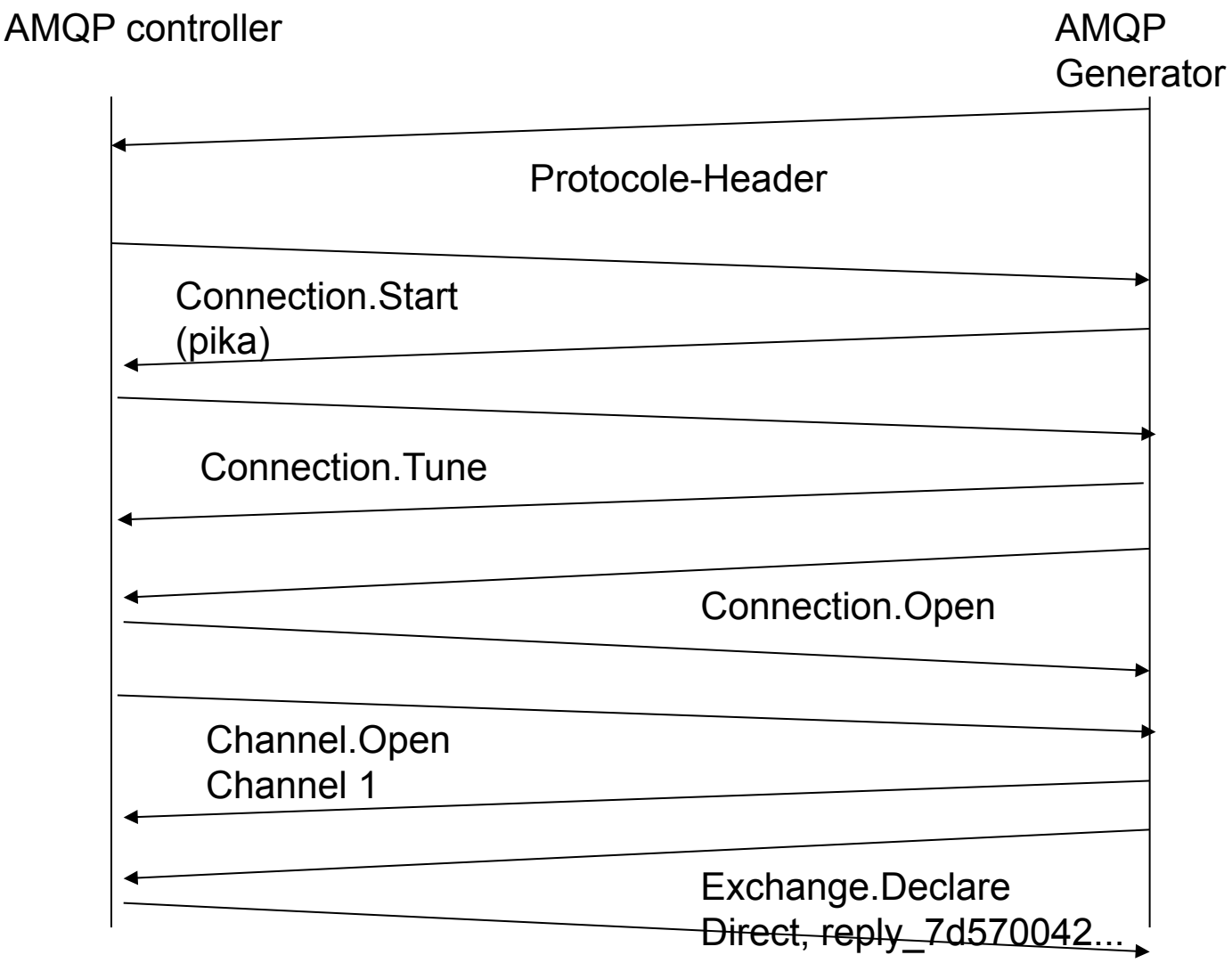
Our goal is to test:
- Impact of WAN on AMQP messages performance
- Functional impact

AMQP test cases

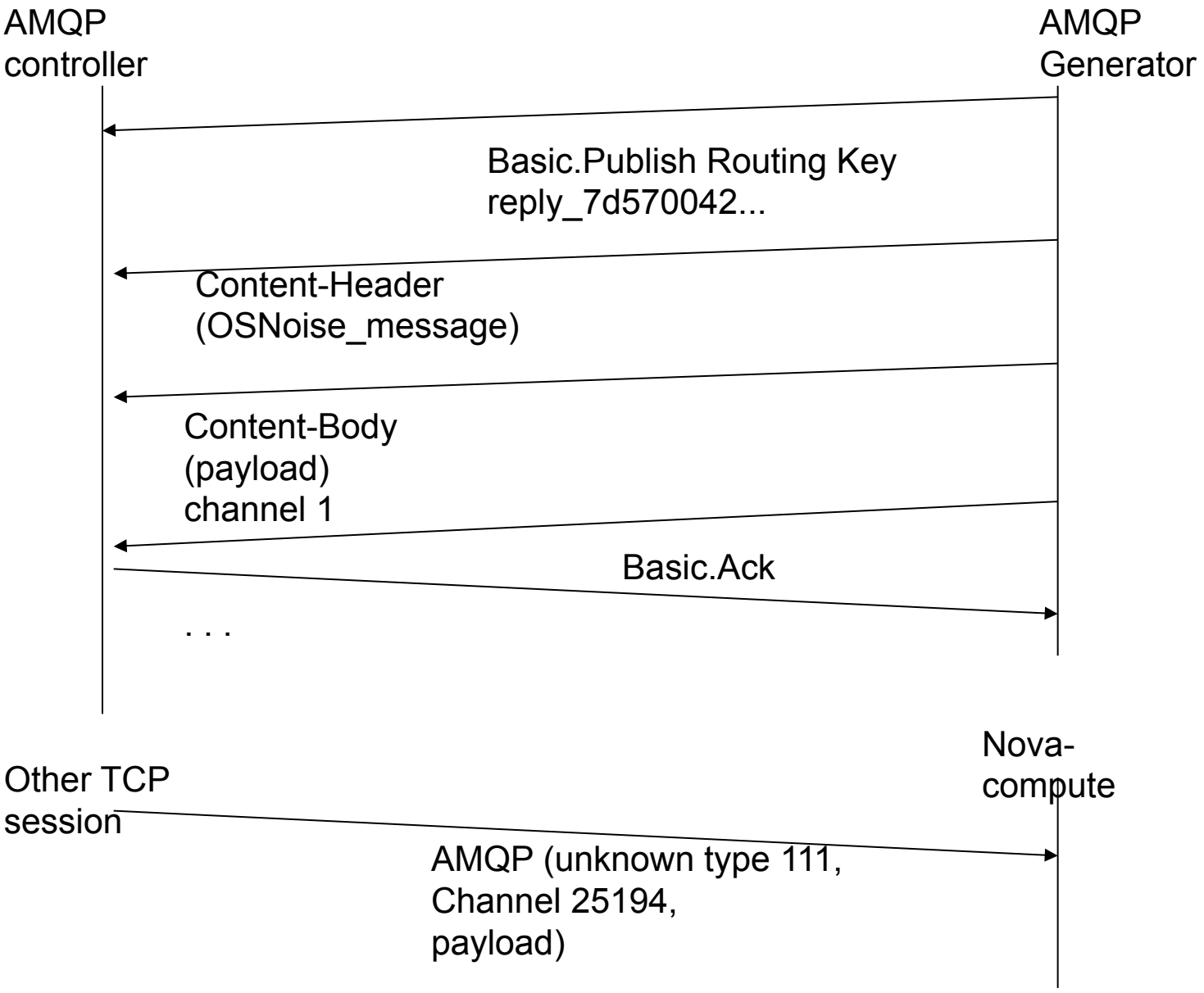
List of tests cases to be performed :

- VM creation without delay nor packet loss nor AMQP stress
- VM creation with delay up to 200ms
- VM creation with delay up to 200ms and 5% packet loss
- VM creation with delay up to 200ms and 5% packet loss and AMQP stress
- VM creation with delay up to 200ms and 5% packet loss and AMQP stress with a link disconnection and reconnection after 5s

AMQP generator time diagram (1/2)



AMQP generator time diagram (2/2)



AMQP generator configuration

- AMQP generator uses python-pika library
- The file config allows to set up the type of AMQP exchange and the payload as well as the throuput (messages/second):

  - exchange_name = reply_7d57004226564739ccad7e7778ddf61 or discovery for all reply exchanges
  - exchange_type = direct
  - routing_key = reply_7d57004226564739ccad7e7778ddf61
  - message_payload = {"oslo.message":"{\"_msg_id\": \"DUMMY_RESPONSE_MESSAGE\", \"method\": \"test_generateur\", \"_dummy_payload\":\« **0123456789…01234567890**\"}", "oslo.version": "2.0"}
  - **publish_rate = 100**
  - duration = 30

Preliminary results

- The duration for instantiating a VM is measured in an environment where :
  - the TCP sessions are stressed (AMQP messages between controller and the agents)
  - the RabbitMQ controller is stressed (representing up to 100 computes)
- Creation time increases with AMQP load (1000 msg/s): by factor 3.5
- Creation time increases with delay :
  - 100 ms by factor 3.5
  - 200 ms by factor 7.1
- Creation time increases with both load and delay (1000msg/s, 100 ms) by factor 7.6

Next steps

What we achieved so far:

- RabbitMQ traffic matrix identification
- Development of a first version of RMQ traffic generator (mirroring OpenStack messages)

- Perform more measurements to evaluate precisely the impact on system performances of RabbitMQ controller performance versus WAN performance issues

- Do we really need to load RabbitMQ with external tool or can we rely on massive creation of VMs through Rally or ENOS?

-Thank you-

orange™