

Message Queue Subsystem Design - Under Development

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This document is under development

Overview

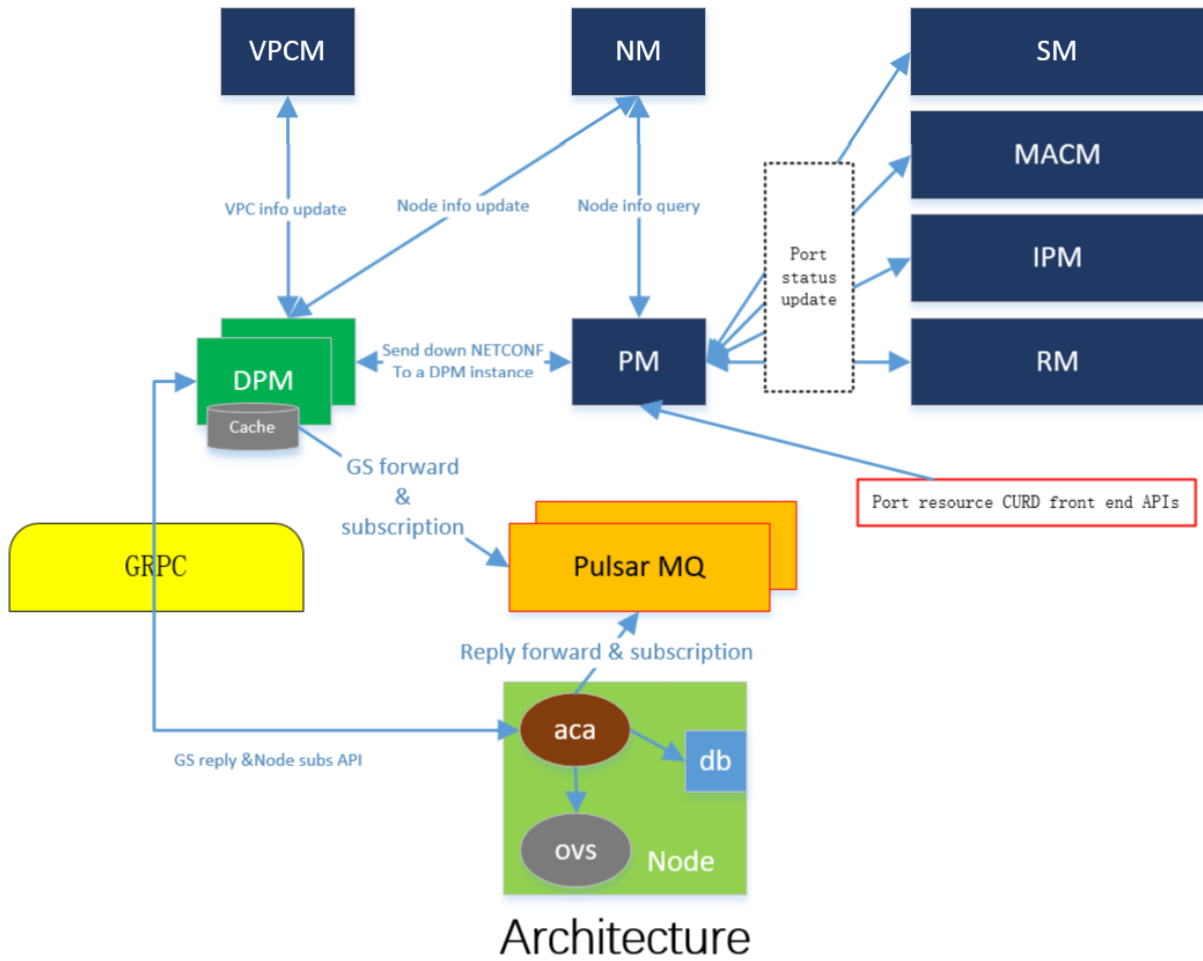
Alcor provides messaging services for controller and agent communication. Messaging services consists of two channels. GRPC and pulsar MQ.

System Requirements

1. DPM can split the network configuration into multiple goal states. DPM can appropriately choose MQ or GRPC channel to send goal state to the corresponding ACA.
2. When ACA configures goal state successfully, it returns success reply. When DPM receives replies of all goal states for a network configuration, it returns successful configuration to the caller
3. Messaging services can support 1000,000 data plane nodes.
4. Working together with other services including Node, Port, VPC, Data Plane managers.
5. Fast, reliable and scalable

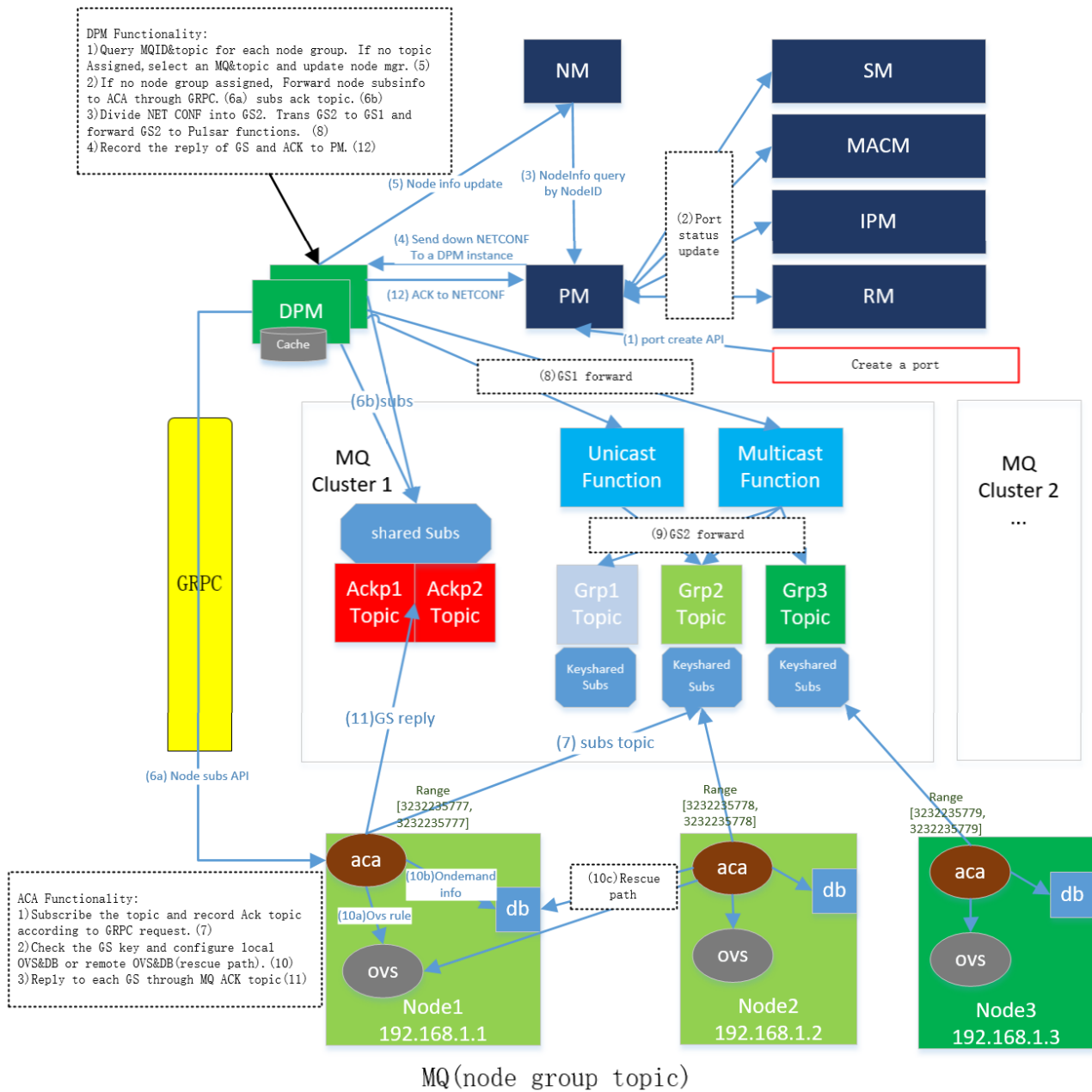
Design

Architecture



We have two architectural design options.

Design Option: MQ (Node Group Topic)

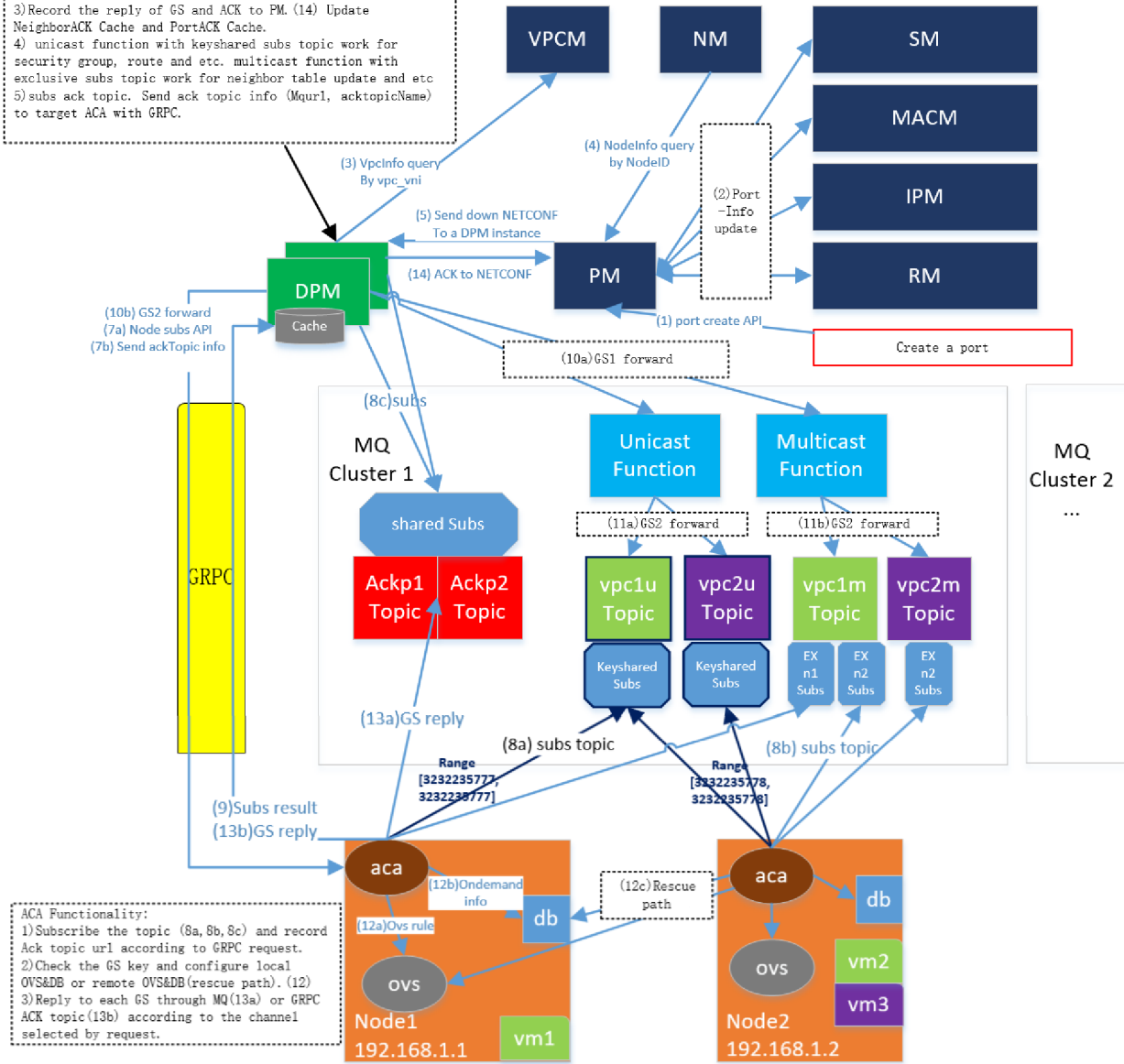


Design Option: MQ (VPC Topic) + GRPC

Workflow

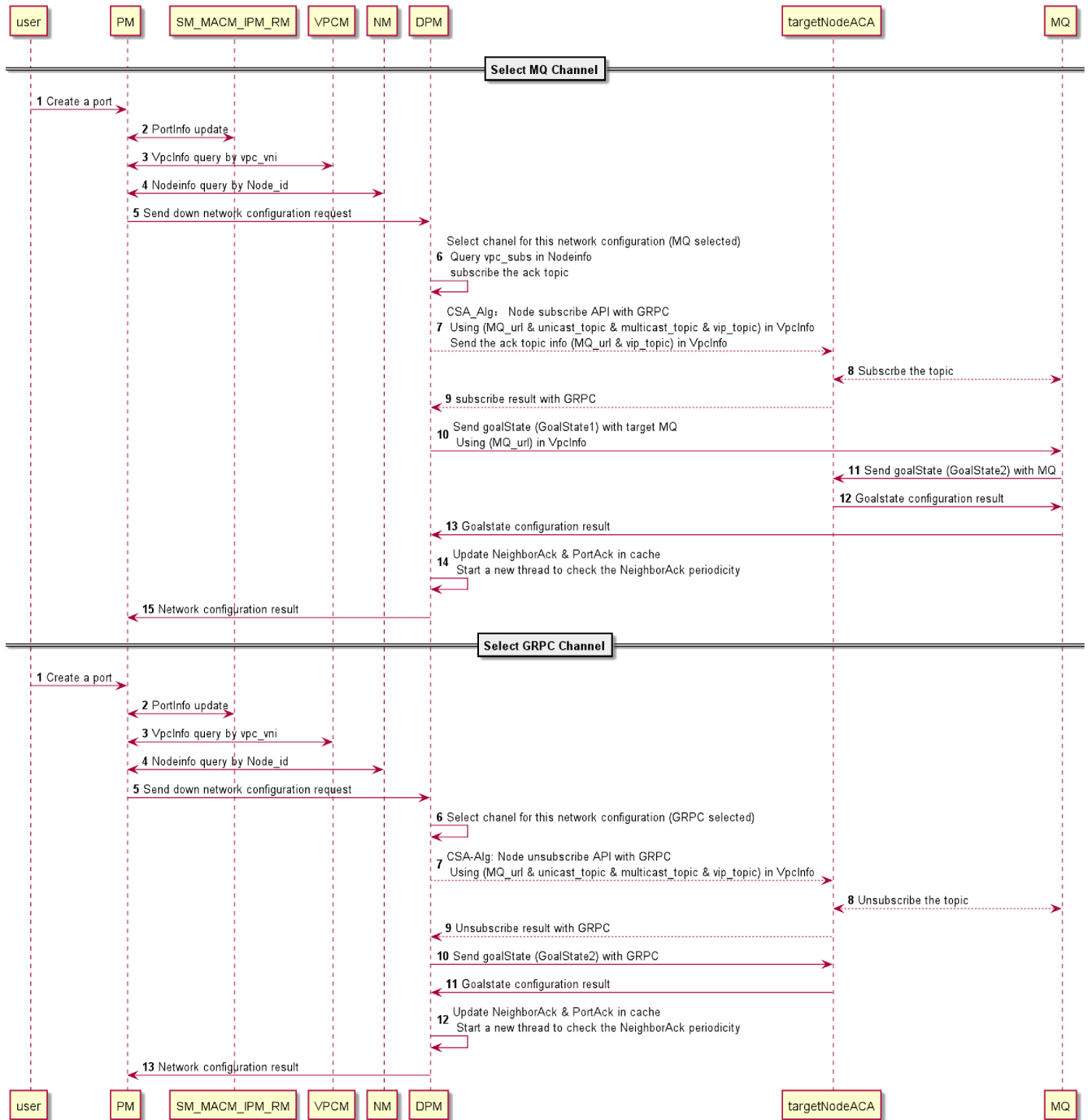
DPM Functionality:

- 1) Select channel for GoalState forward(6)
 - 1.1) If MQ&topic exists for the vpc,
 - 1.1.1) if vpc size<X and max security group size <Y, let ACA unsub topic by GRPC (7b). Divide NET CONF into GS1 and forward GS1 by GRPC (10b).
 - 1.1.2) if vpc size>X or max security group size >Y, if node didn't subs vpc topic, let ACA subs topic by GRPC (7a). Divide NET CONF into GS2. Trans GS2 to Pulsar functions. (10a)
 - 1.2) If no topic Assigned:
 - 1.2.1) if vpc size<X and max security group size <Y, Divide NET CONF into GS2 and forward GS2 by GRPC. (10b)
 - 1.2.2) if vpc size>X or max security group size >Y, Let ACA subs topic through GRPC. Divide NET CONF into GS2. Trans GS2 to GS1 and forward GS1 by MQ. (10a)
- 2) Subscript API using MQ_url&topic for each VpcInfo. (7a)
- 3) Record the reply of GS and ACK to PM. (14) Update NeighborACK Cache and PortACK Cache.
- 4) unicast function with keyshared subs topic work for security group, route and etc. multicast function with exclusive subs topic work for neighbor table update and etc
- 5) subs ack topic. Send ack topic info (Mqurl, acktopicName) to target ACA with GRPC.

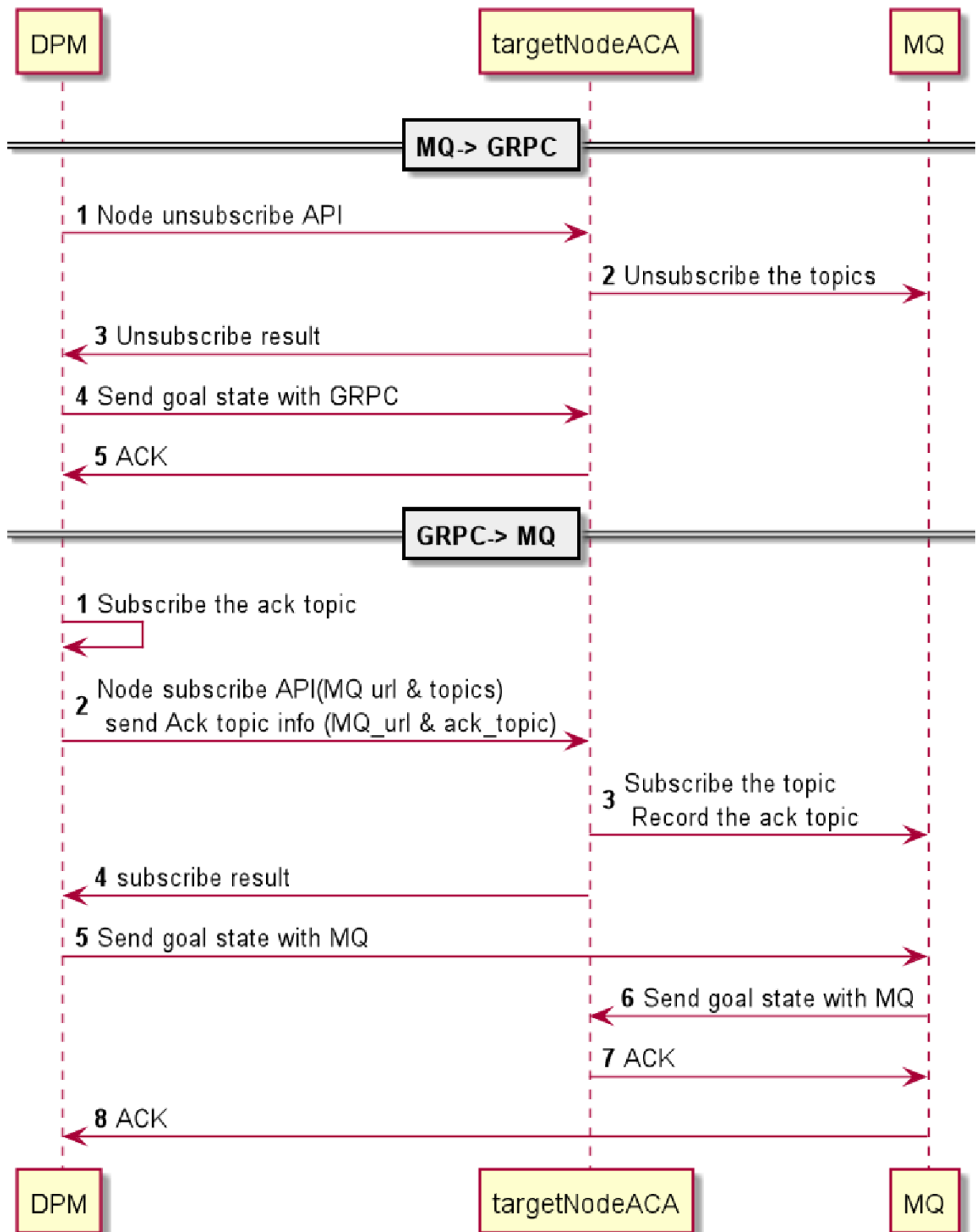


MQ(vpc topic) + GRPC

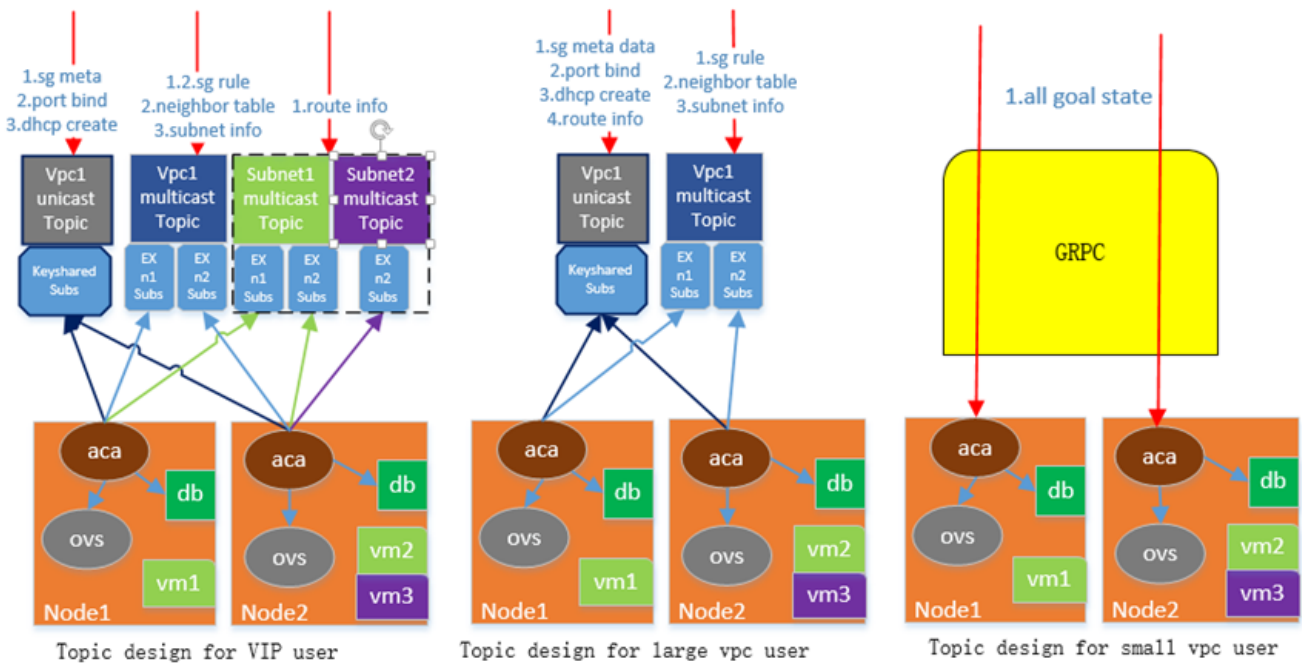
Workflow UML



MQ topic subscription or unsubscription



Channel & MQ topic Selection for each goal state

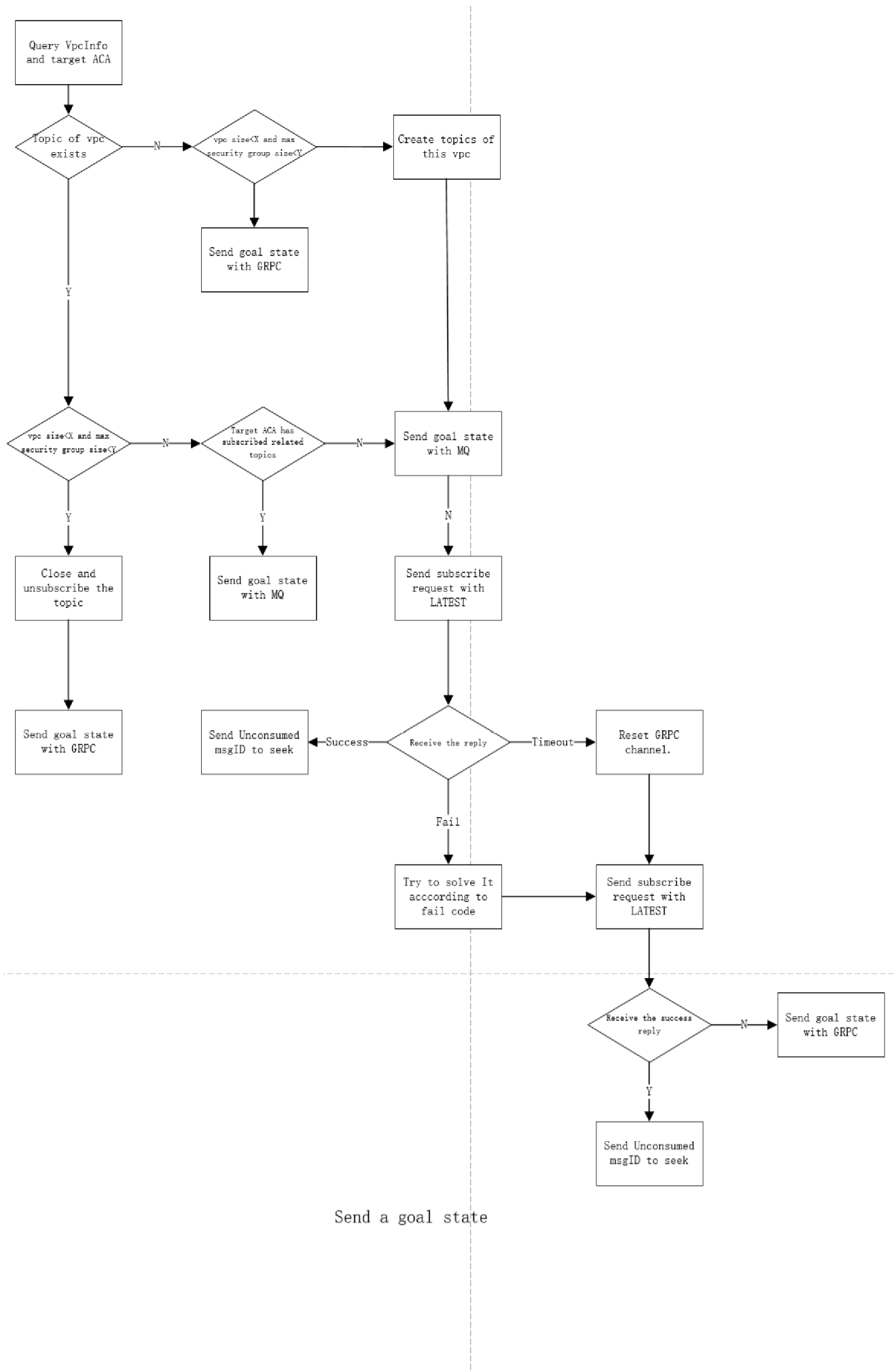


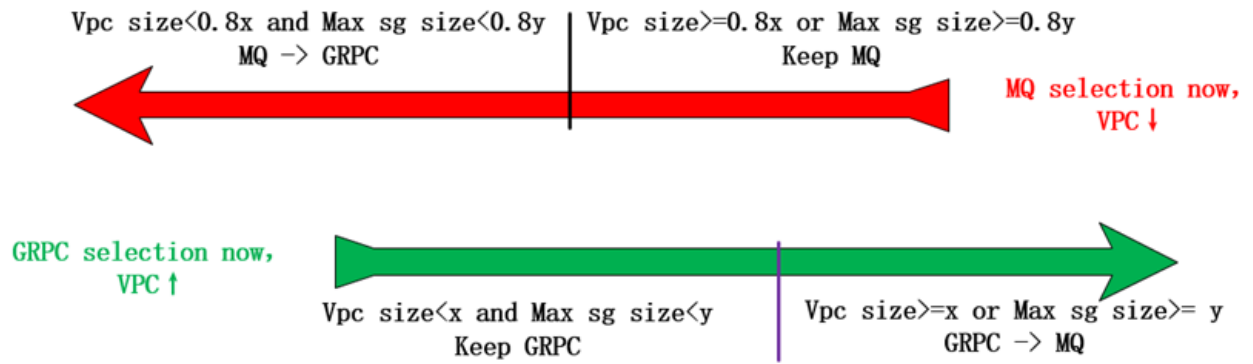
Category	Topic	Examples
Unicast goal state	unicast topic	port bind□dhcp create□route info
Multicast goal state	multicast topic	neighbor table
Group multicast goal state	unicast topic & multicast topic	security group metadata & rule

Channel Selection Algorithm

Algorithm 1 CSA: Channel Selection Algorithm for Alcor

```
1:  $X$  and  $Y$  are two constants.
2: if The topic of vpc-1 already exists in MQ. then
3:   if Size of vpc-1 is greater than  $0.8X$  or a security
   group is mapped to more than  $0.8Y$  ports then
4:     if Target ACA does not subscribe topics of vpc-1
       then
5:       Target ACA subscribes both unicast&multicast
       topics of vpc-1 with SubscriptionInitialPosi-
       tion.Earliest.
6:       if Receive subscribe failed ACK then
7:         Sending goal state of vpc-1 with MQ.
8:       if Receive subscribe failed ACK then
9:         Resubscribe the topic. Go to line 5.
10:      if Subscribe timeout then
11:        Reset GRPC channel. Resubscribe the topic.
        Go to line 5.
12:   if Size of vpc-1 is smaller than  $0.8X$  and no security
   group is mapped to more than  $0.8Y$  ports then
13:     Close the topic of vpc-1, let related ACA unsub-
     scribe the topic when at the right time.
14:     Send goal state of vpc-1 to the target ACA with
     GRPC.
15: if There is no topic of vpc-1 in MQ. then
16:   if Size of vpc-1 is greater than  $X$  or a security group
   is mapped to more than  $Y$  ports then
17:     Create topics of vpc-1
18:     Target ACA subscribes unicast&multicast topics of
     vpc-1 with SubscriptionInitialPosition.Earliest.
19:     if Receive subscribe failed ACK then
20:       Seek the multicast topic by unconsumed msgID.
21:       Send new unicast goal state to unicast topic.
22:       Send all multicast goal states to multicast topic
23:     if Receive subscribe failed ACK then
24:       Sending goal state of vpc-1 with GRPC.
25:     if Subscribe timeout then
26:       Reset GRPC channel. Resubscribe the topic. Go
       to line 18.
27:   if Size of vpc-1 is smaller than  $X$  and no security
   group is mapped to more than  $Y$  ports then
28:     Sending goal state of vpc-1 with GRPC.
```

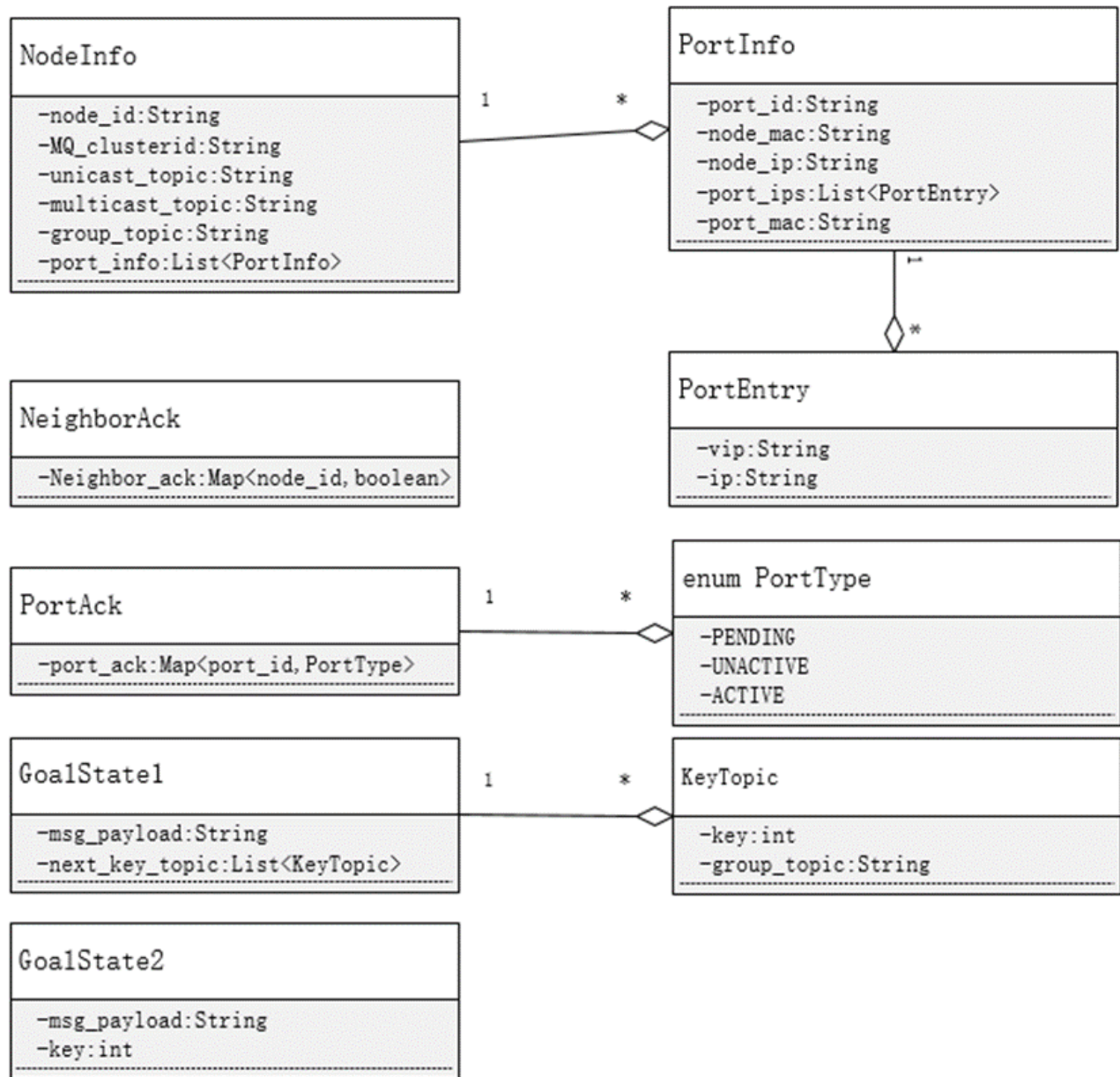




Channel selection

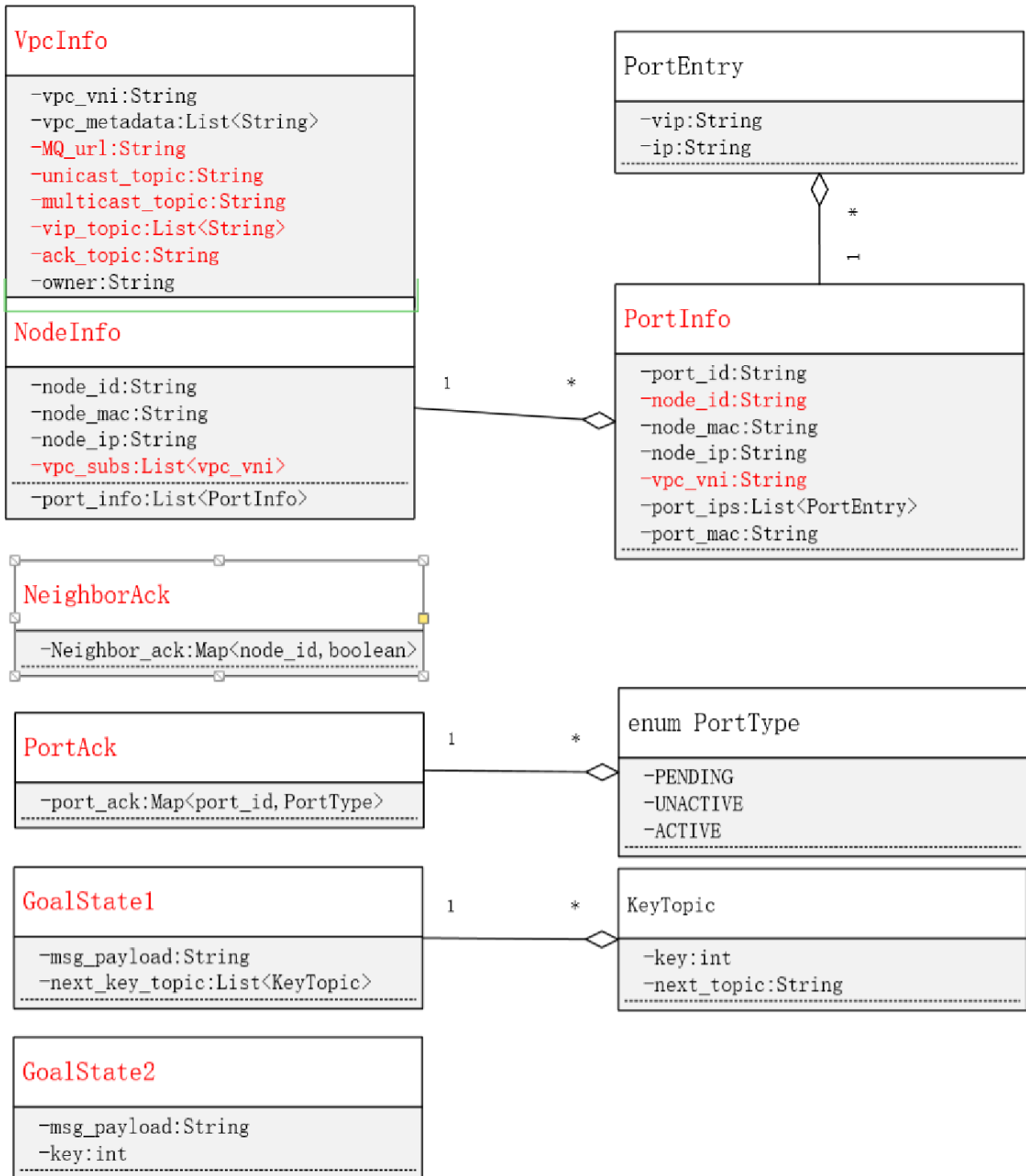
Data schema

Design Option: MQ (Node Group Topic)



MQ(node group topic)

Design Option: MQ (VPC Topic) + GRPC



MQ(vpc topic) + GRPC

Task Allocation

Name	Task
Min Chen	Interaction among managers (steps 1-5 in Workflow UML:select MQ Channel & select GRPC channel); Channel selection ALG (step 6 in Workflow UML:select MQ Channel & select GRPC channel)
Luyao Luo	ACA subscript/unsubscript (steps 8,9 in Workflow UML:select MQ Channel & select GRPC channel)
Jiawei Liu	subscript/unsubscript API (step 7 in Workflow UML:select MQ Channel & select GRPC channel); Goalstate send (steps 10,11 in Workflow UML:select MQ Channel; step 10 in Workflow UML:select GRPC channel)

References

- [1] Apache Ignite: <https://ignite.apache.org/>
- [2] Apache Pulsar: <http://pulsar.apache.org/>