Redundancy and Load-Balancing Mechanisms for Stateful Network Address Translators (NAT)

draft-xu-behave-stateful-nat-standby-00

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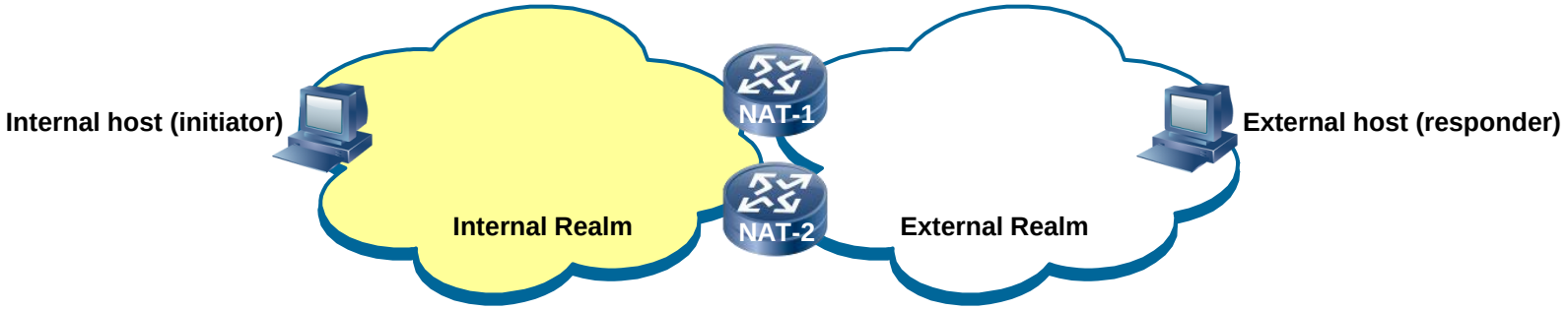
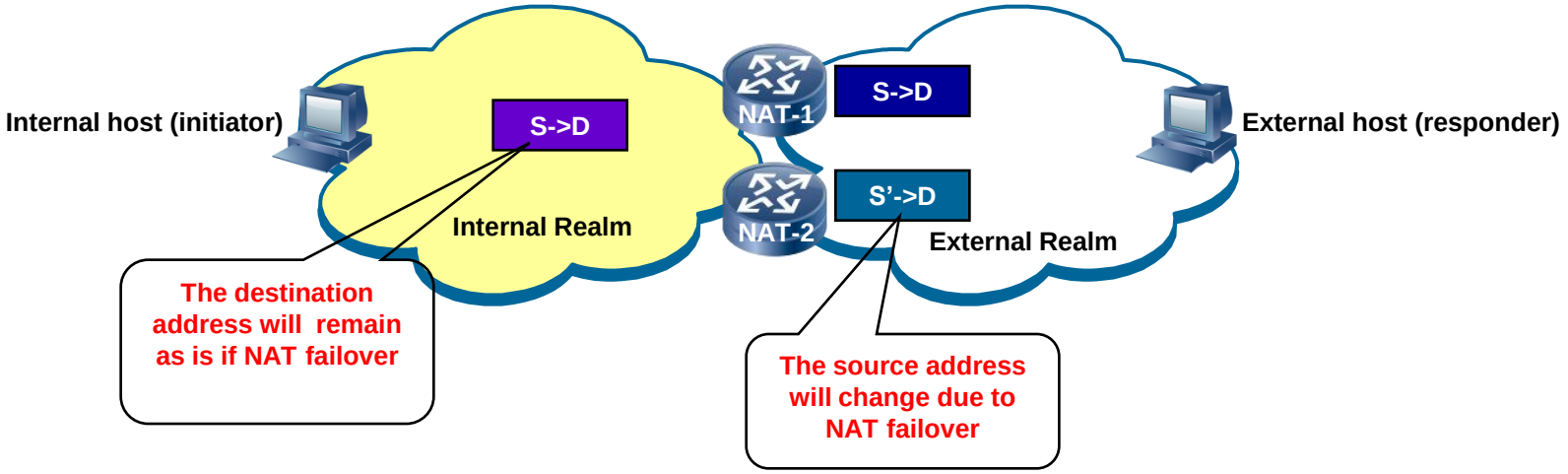
Scenarios and Terminologies



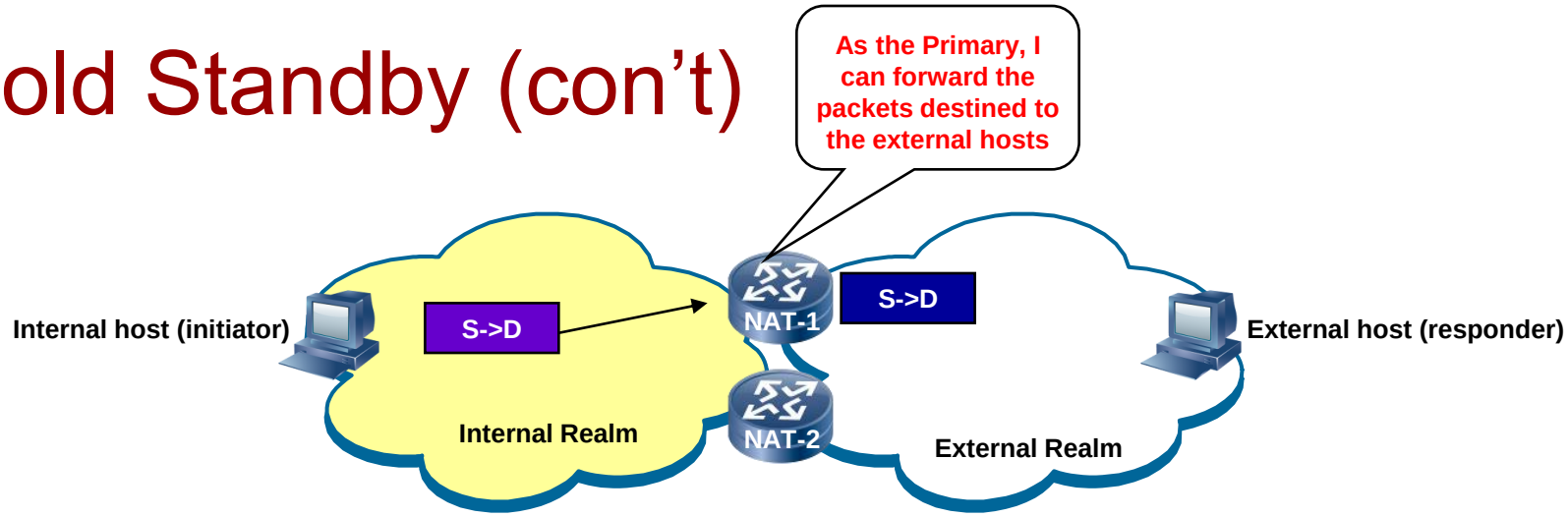
- **Internal realm is the network where the session initiator located, while the external realm is the place where the session responder located.**
  - E.g., in the case of IPv6 to IPv4 translator, the internal realm is IPv6 network/Internet while the external realm is IPv4 network/Internet.
- **The mechanism is only used for the stateful NAT, including IPv6->IPv4 , IPv4->IPv4 and IPv4->IPv6 NAT cases.**
- **The following will take the IPv6->IPv4 translator as an example.**

Cold Standby



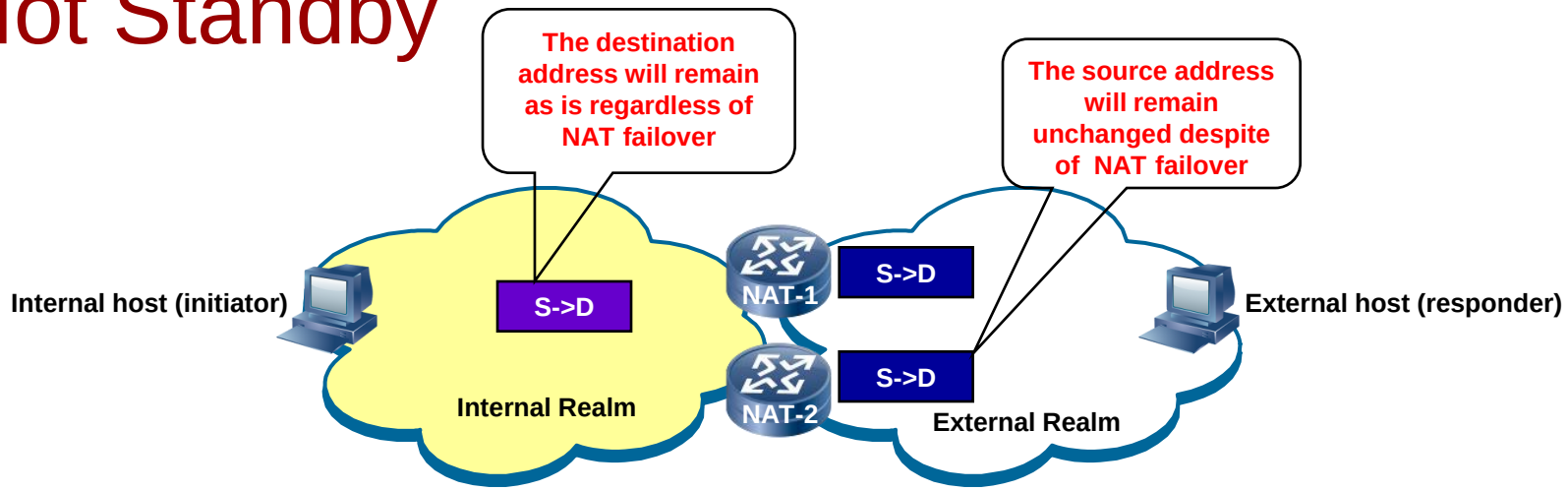
- **The goal of the cold standby mechanism is to keep the NAT failover transparent to the communication's session initiators. Hence, the addresses for external hosts (as session responders) should remain as is despite NAT failover.**
  - In the case of IPv6->IPv4 NAT, NAT routers belonging to a redundancy group SHOULD be configured with an identical prefix64, meanwhile each NAT router SHOULD use different external address pool.

Cold Standby (con't)



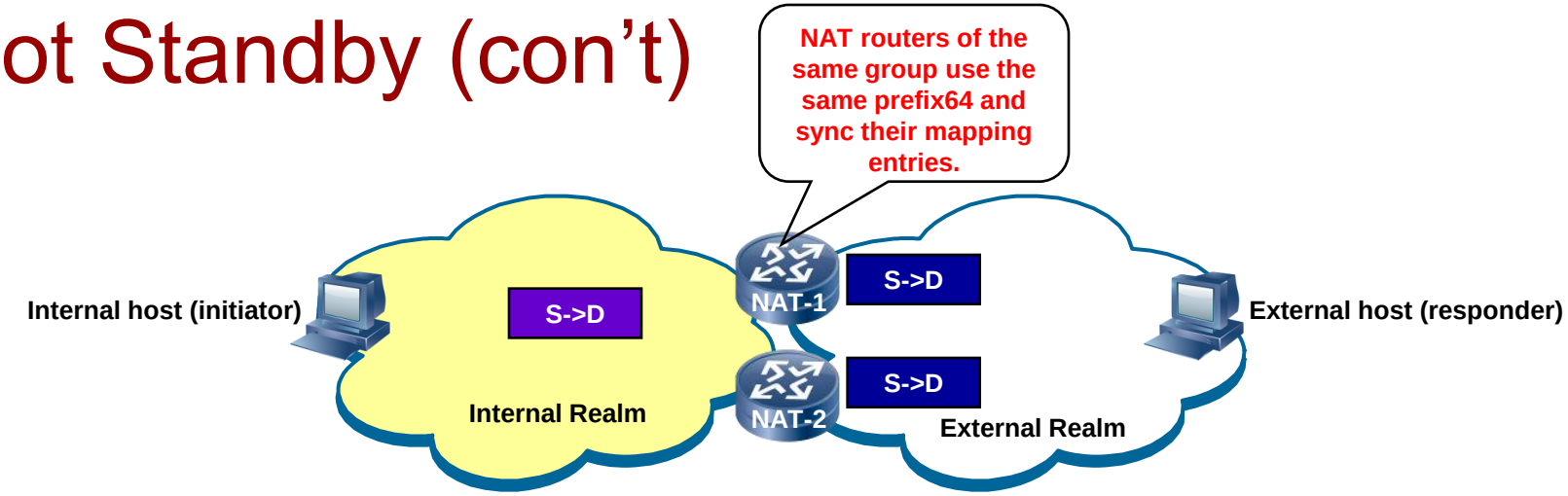
- **Through manual configuration or election mechanism (VRRP), one NAT router is designated as the Primary, and the other as the Backup.**
- **In the internal realm, the Primary announces a route towards the external realm.**
  - In election mode, the Backup could do nothing. In manual configuration mode, the Backup SHOULD also announce into the internal realm a route towards the external realm with a higher enough cost or larger granularity for potential takeover.
  - Once the connections to the external realm lost, the Primary SHOULD withdraw the route towards the external realm previously announced.
- **In the external realm, each NAT box announces a route to its own external address pool.**

Hot Standby



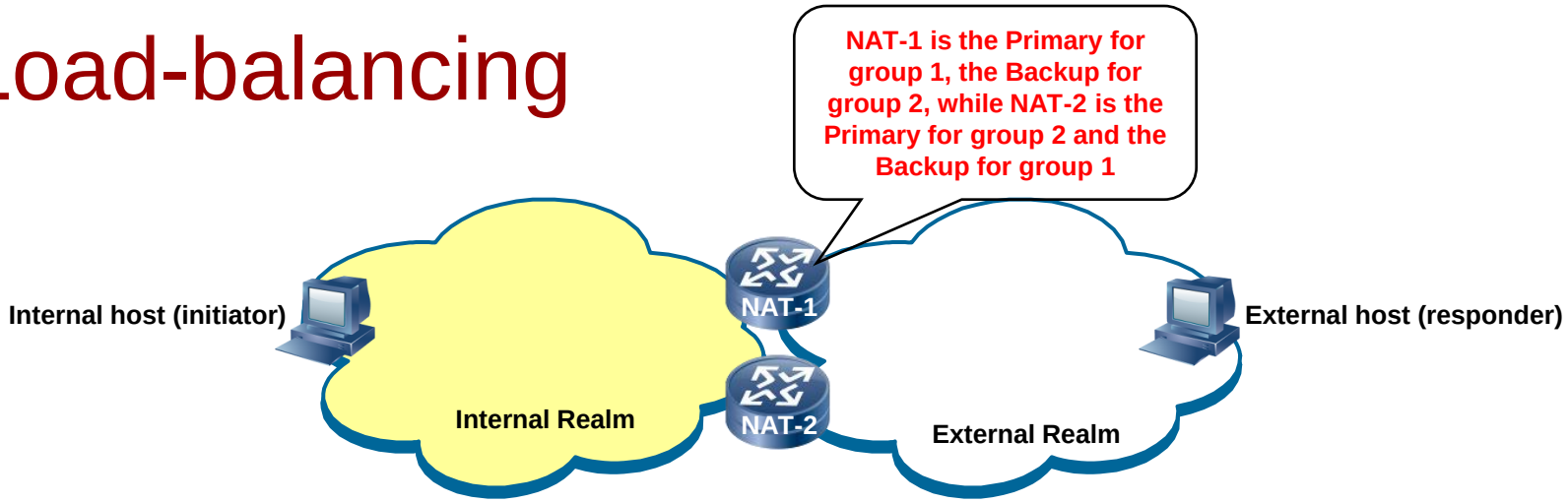
- **The goal of the hot standby mechanism is to keep the established sessions intact during NAT failover. Hence, the internal addresses for external hosts (as session responders) and the external addresses for internal hosts should both remain as is if NAT failover occurs.**
  - In IPv6->IPv4 NAT, NAT routers belonging to a redundancy group SHOULD be configured with an identical prefix64. Meanwhile, these NAT routers SHOULD use an identical external address pool and synchronize their mapping database in order to assign the same external address and external port to the same internal host by the two boxes.

Hot Standby (con't)



- **Through manual configuration or election mechanism (VRRP), one is designated as the Primary, the other as the Backup.**
- **The Primary announces into the internal realm a route towards the external realm, and announces into the external realm a route to the external address pool.**
  - In election mode, the backup COULD do nothing. In manual configuration mode, the Backup SHOULD also announce the same routes with a higher enough cost or larger granularity for potential takeover.
  - Once the connections to the external realm lost, the Primary SHOULD withdraw the route towards the external realm previously announced.
- **These two NAT routers SHOULD synchronize their mapping database in a timely fashion.**

Load-balancing



- **Two redundancy groups (e.g., Group A and Group B) are created on two NAT boxes. One is the Primary for group A, while the other is the Primary for group B, and the same time, they are the Backup serving the other group, respectively.**
  - Take IPv6->IPv4 NAT as an example, each group is associated with different Prefix64.
  - For cold standby, each NAT router could use either the same or different external address pool for these redundancy groups. However, the external address pools on different NAT routers SHOULDN'T have any overlap.
  - For hot standby, each group SHOULD be associated with a difference address pool.
- **The load-balance mechanism used by the internal hosts is outside of the scope of this document.**

Next step

- **Adopted as WG draft?**