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CCNinfo: Discovering Content and Network Information in Content-Centric Networks

draft-irtf-icnrg-ccninfo-02

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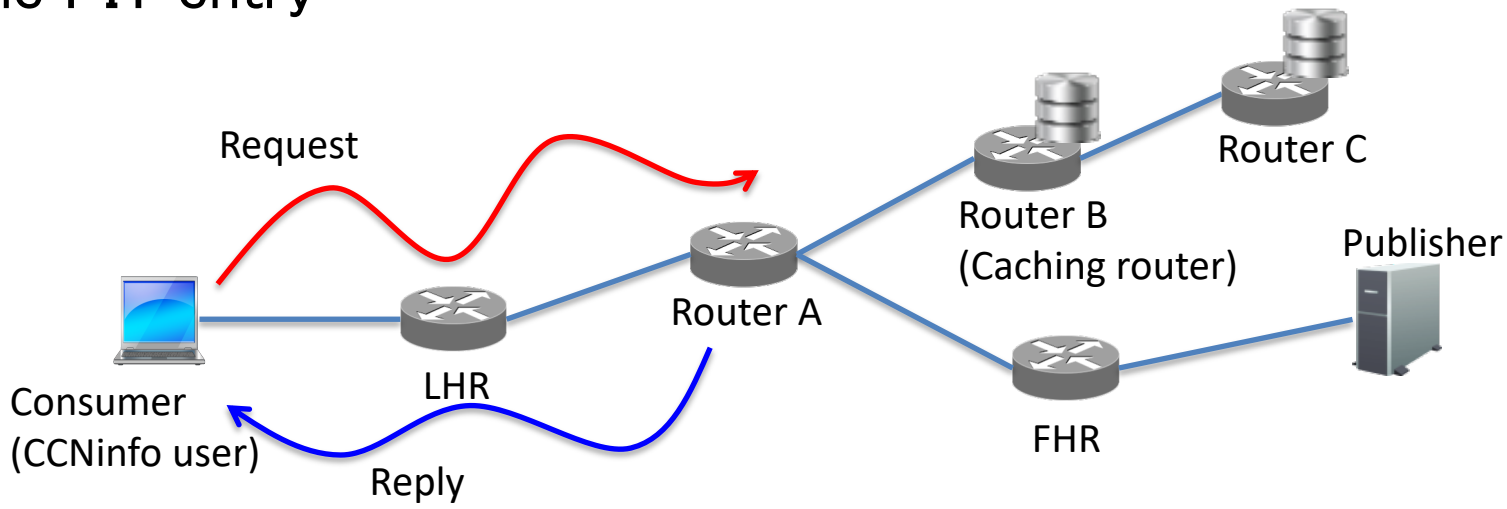
Changes

- Clarification
  - Routers vs. content forwarders (or forwarders)
  - Cache vs. unexpired cache
- 3.2.1.1. Reply Sub-Block
  - Scale up the Object size for Reply Sub-Block
    - Cob size (Byte -> KB), 4.29 TB maximum for 32 bit field
  - Counter refresh
    - If the cache is refreshed after reboot, the counter MUST be refreshed (i.e., MUST set to 0). If the cache remains after reboot, the counter MUST NOT be refreshed (i.e., MUST be kept as is).
- Add IANA section (yet it's incomplete)

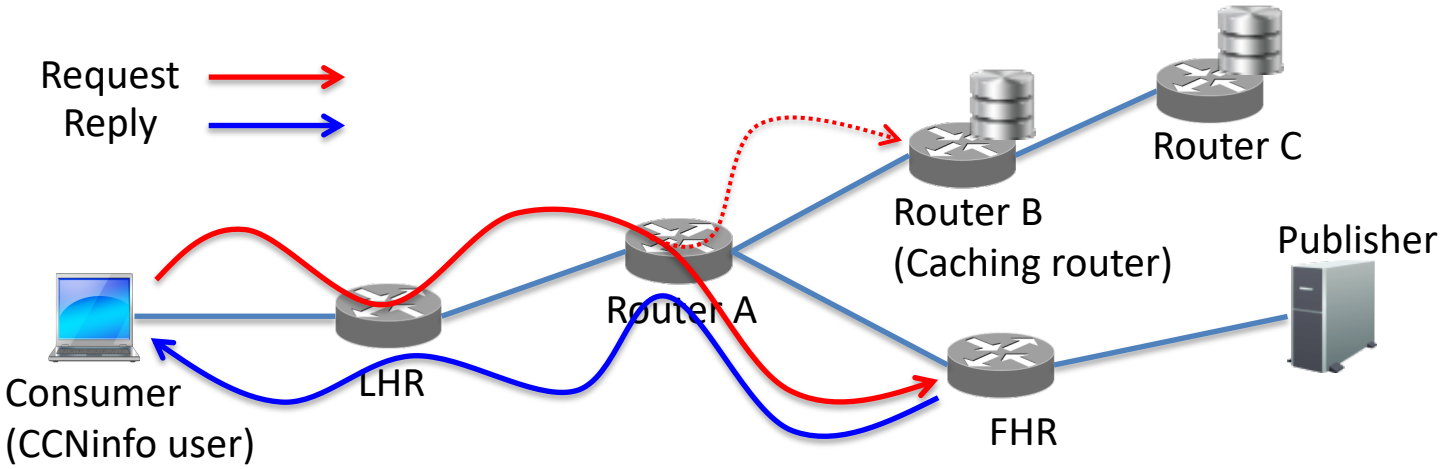
CCNinfo Request and Reply

- **CCNinfo user** initiates **Request message** (with **Request block**) and sends the message to **LHR**
- **LHR** and **other routers** along the path insert their **Report blocks** in the hop-by-hop header and forward the message based on their FIBs in a hop-by-hop manner
- **Caching routers** (having the specified content) or **FHR** append **Reply block** and **Reply sub-block(s)** to the message and send the message as **Reply message** toward CCNinfo user along the PIT entry



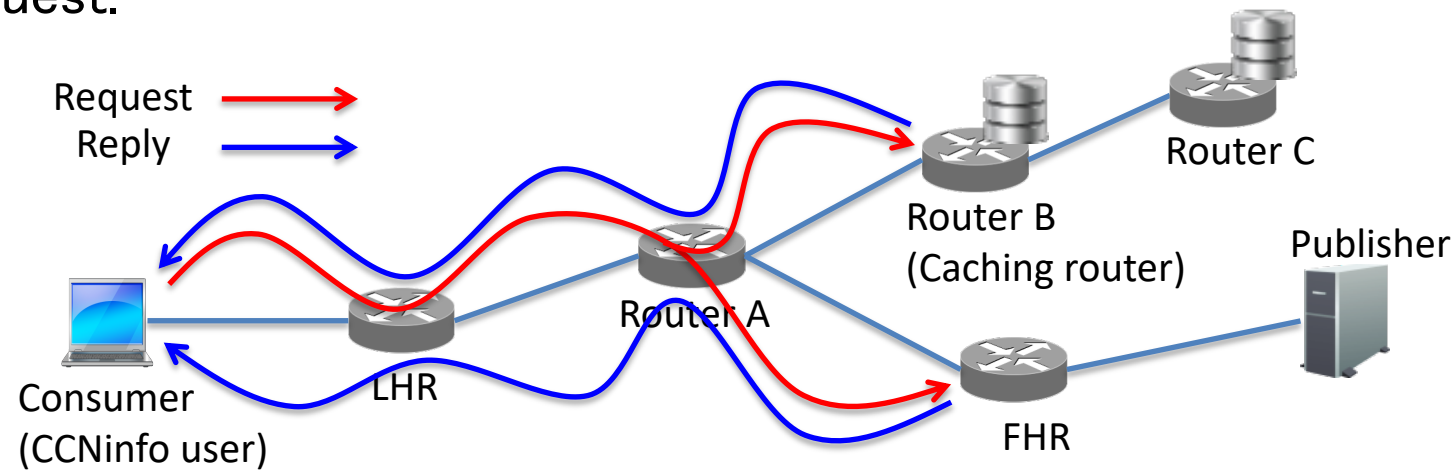
Default Behavior

- Some router may have strategy for multipath forwarding; when it sends Interest messages to multiple neighbor routers, it may delay or prioritize to send the message to the upstream routers.
- The CCNinfo Request, as the default, complies with such strategy; a CCNinfo user could trace the actual forwarding path based on the forwarding strategy.



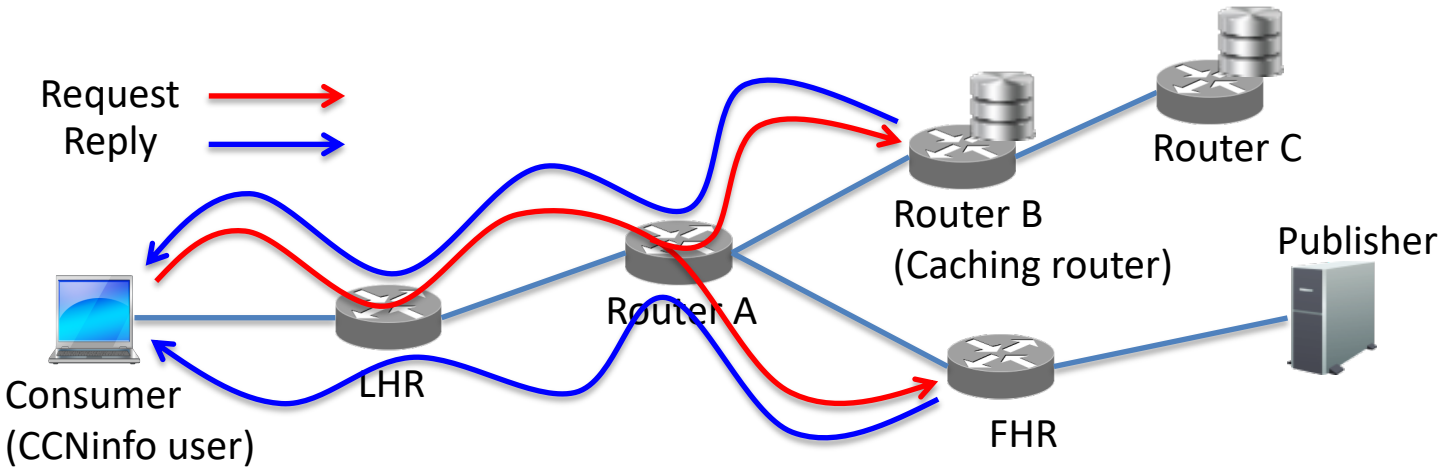
Full Discovery Request

- There may be the case that a CCNinfo user wants to discover all potential forwarding paths based on routers' FIBs. The full discovery request enables this function.
- If a CCNinfo user sets the F flag in the Request block of the Request message to request the full discovery, the upstream routers forward the Requests to the all multiple upstream routers based on the FIBs simultaneously. Then the CCNinfo user could trace the all potential forwarding paths.
- Note that some routers MAY ignore the full discovery request according to their policy. In that case, the router terminates the Request.



Full Discovery Request – cont'd

- When a CCNinfo user requests the full discovery, to receive the different Reply messages forwarded from different routers, PIT entries initiated by CCNinfo remain until the configured CCNinfo Reply Timeout passes.
- In other words, unlike the ordinary Interest-Data communications in CCN, if the router accepts the fill discovery request, the router SHOULD NOT remove the PIT entry created by the CCNinfo Request until the timeout value expires.



Conclusion

- CCNinfo, which is compatible with CCNx-1.0 TLV format, is a powerful network tool providing various information in CCN
- Need agreement on multipath and security
  - Comments welcome
- Implementation is almost done in Cefore
  - https://cefore.net/

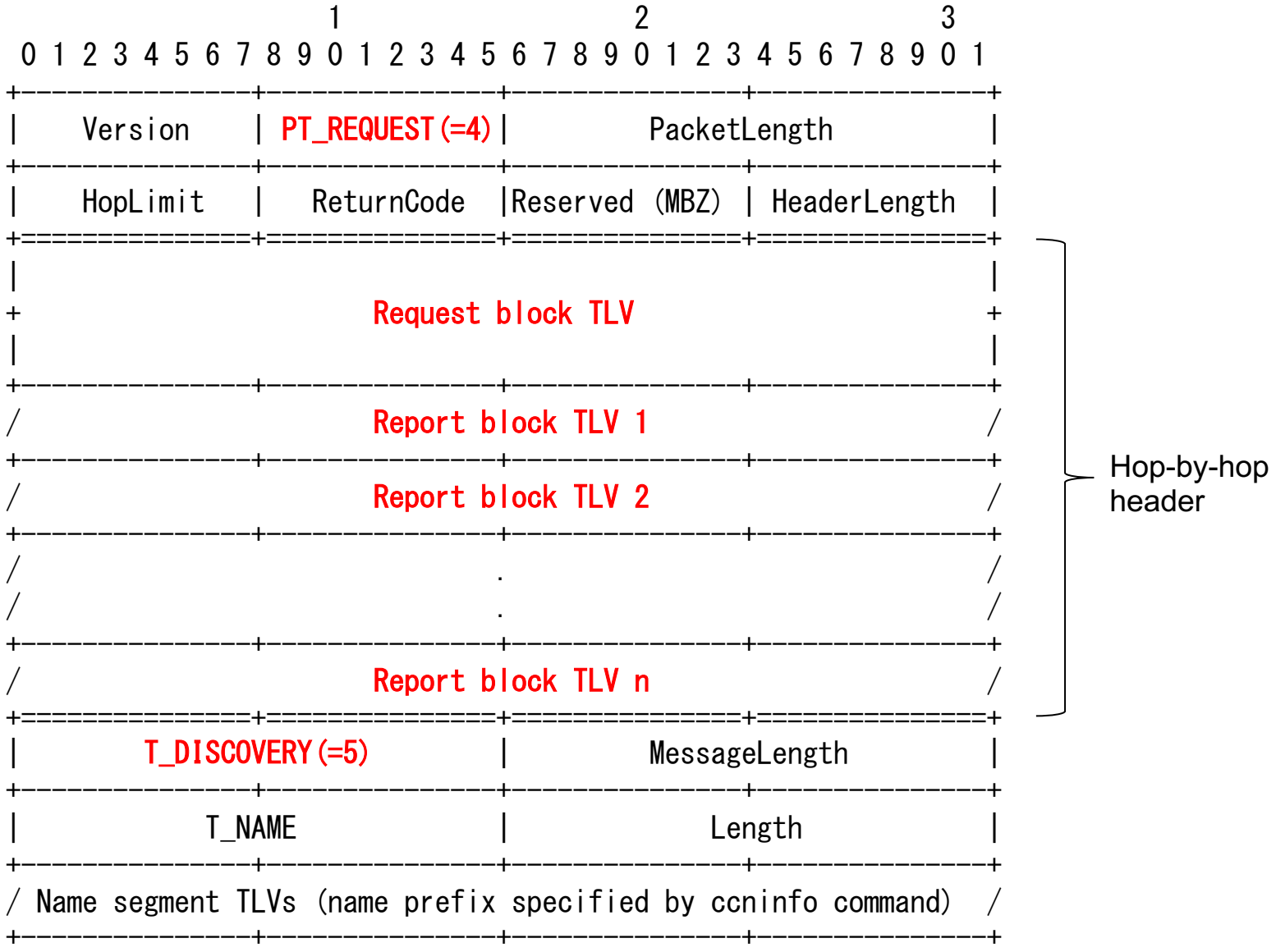
CCNinfo Messages

CCNinfo Request/Reply Messages

- Compatible with CCNx-1.0 TLV format
- CCNinfo Request Message
  - Request message consists of a fixed header, Request block TLV, Report block TLV(s), and Name TLV
- CCNinfo Reply Message
  - Reply message consists of a fixed header, Request block TLV, Report block TLV(s), Name TLV, and Reply block/sub-block TLV(s)

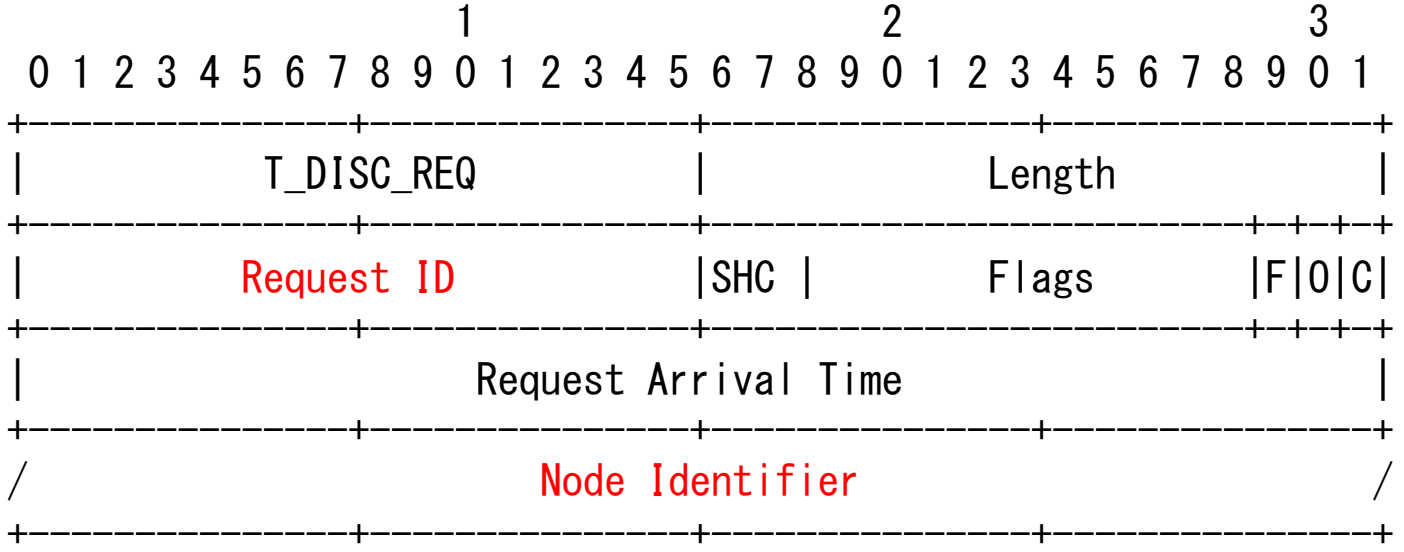
- Type values used by CCNinfo
  - Packet type: PT_REQUEST and PT_REPLY
  - Top level type: T_DISCOVERY
  - Hop-by-hop type: T_DISC_REQ and T_DISC_REPORT
  - CCNx message type: T_DISC_REPLY

Request Message

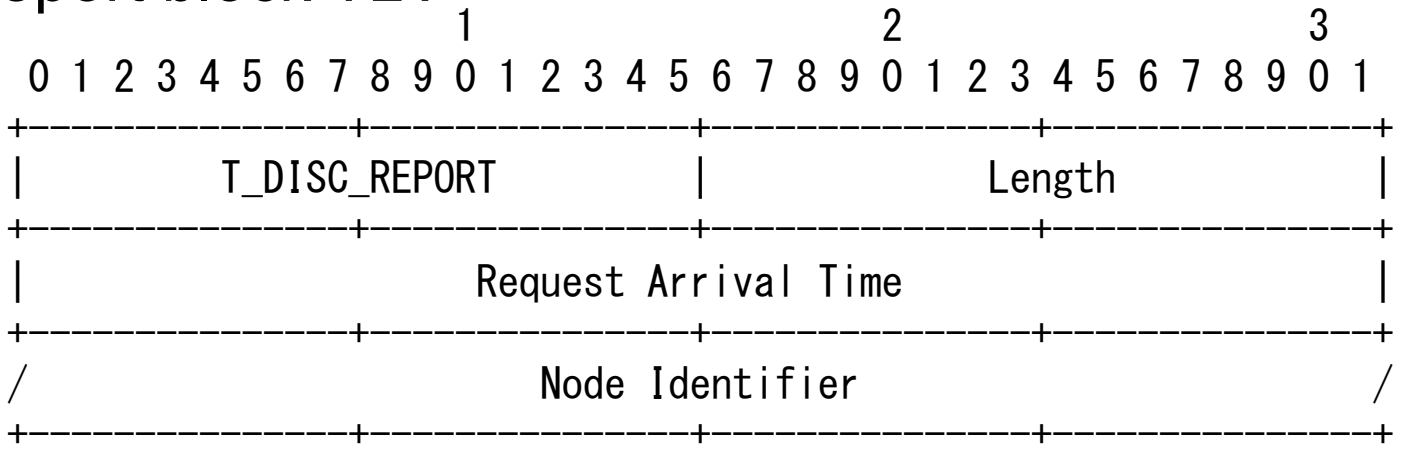


Request Block and Report Block

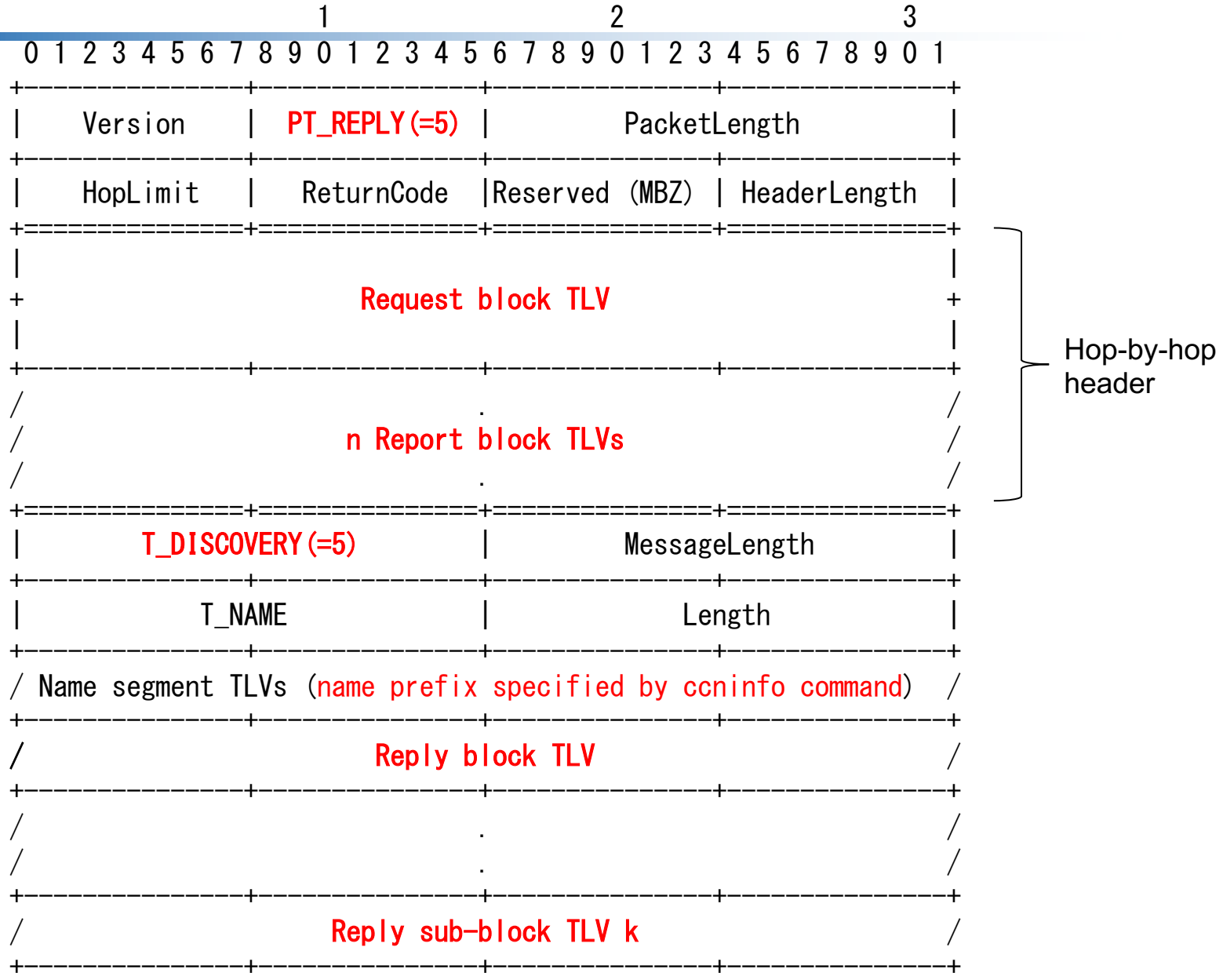
- Request block TLV



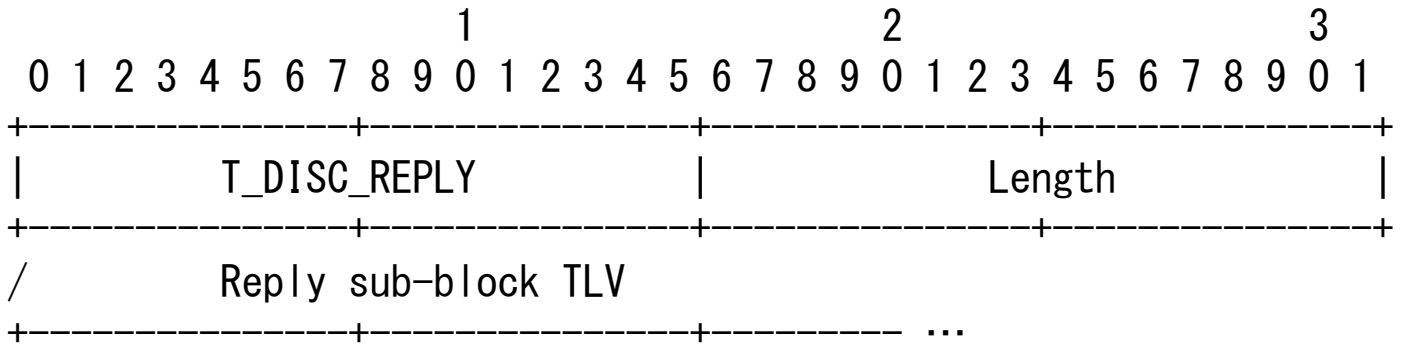
- Report block TLV



Reply Message



Reply Block


1 2 3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
T_DISC_REPLY
Length
Reply sub-block TLV
...

Reply Sub-Block