Timed Operations in I2RS

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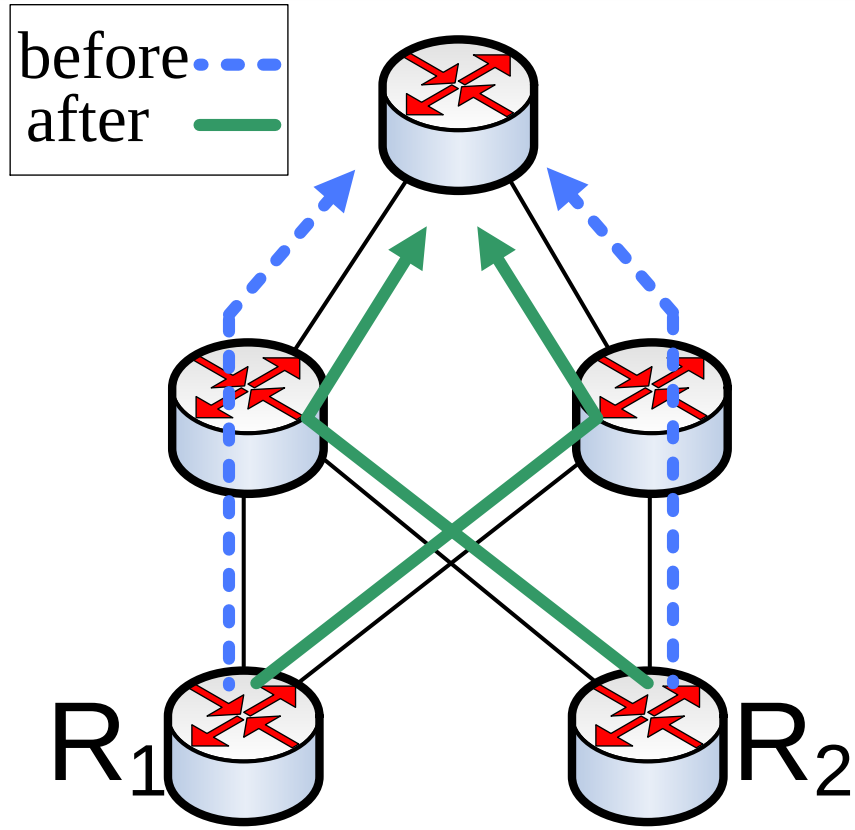
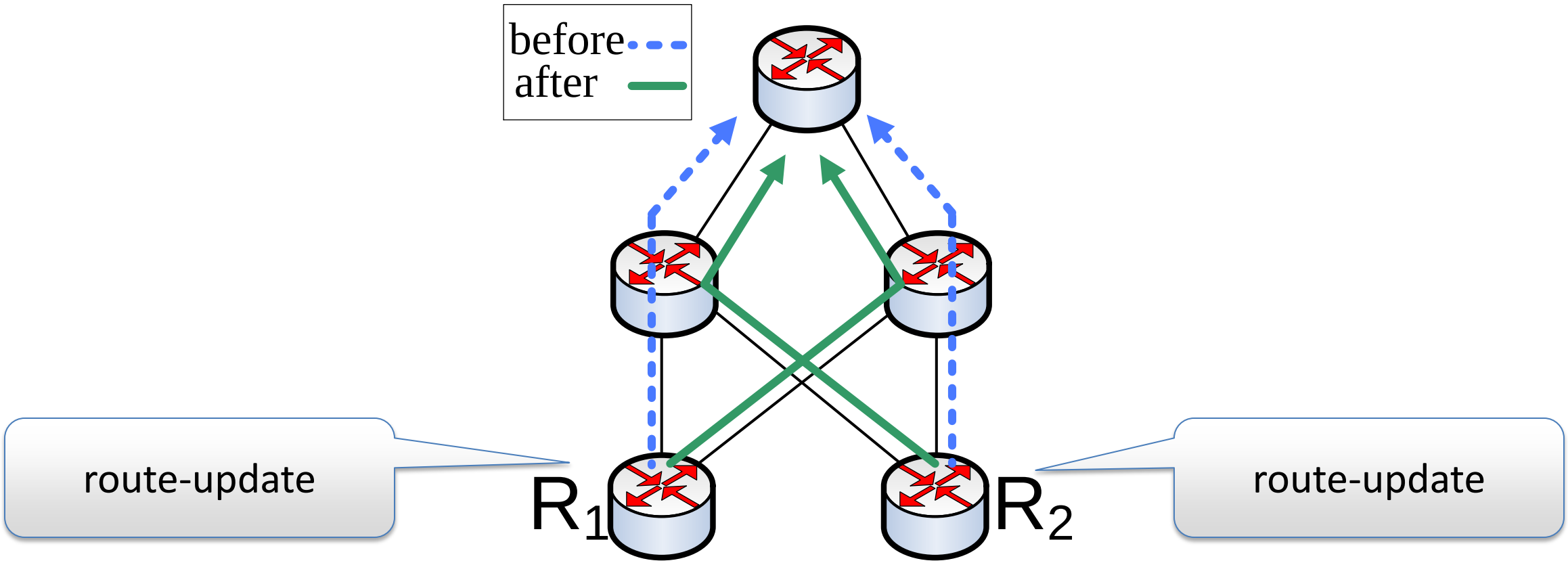
Example 1

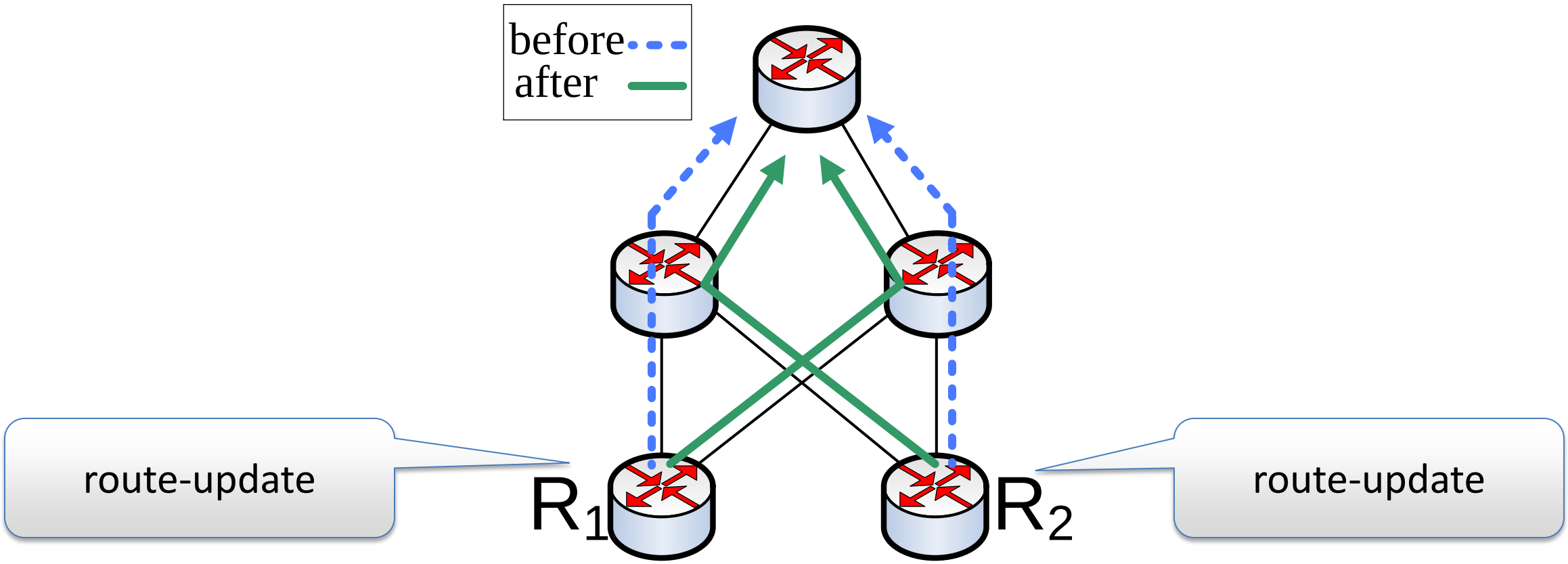
We want to update the RIBs of R1, R2 from the ‘before’ to the ‘after’ paths.



Example 1



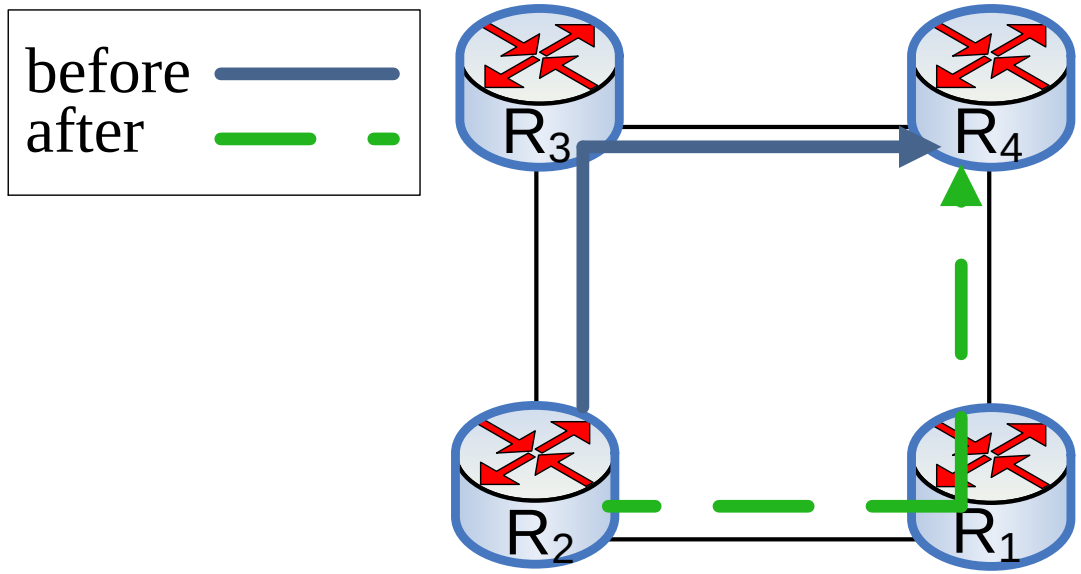
Example 1



If we update R1, R2 (roughly) **at the same time**, we can avoid congestion.

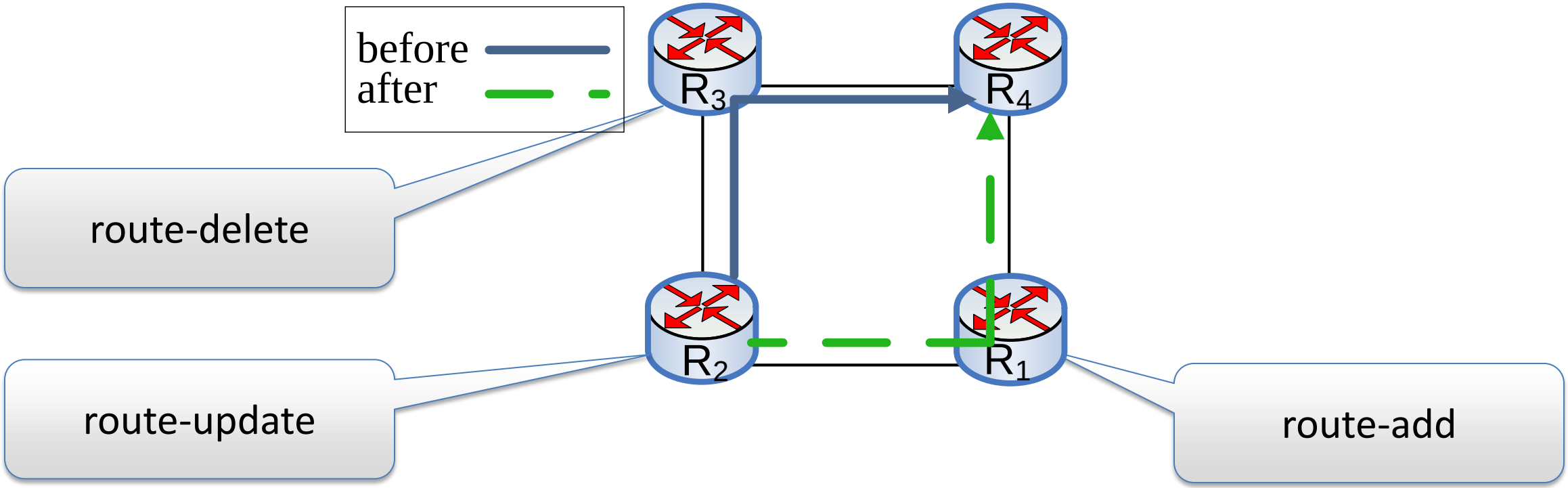
Example 2

A set of RIB updates that will switch from the ‘before’ to the ‘after’ paths.

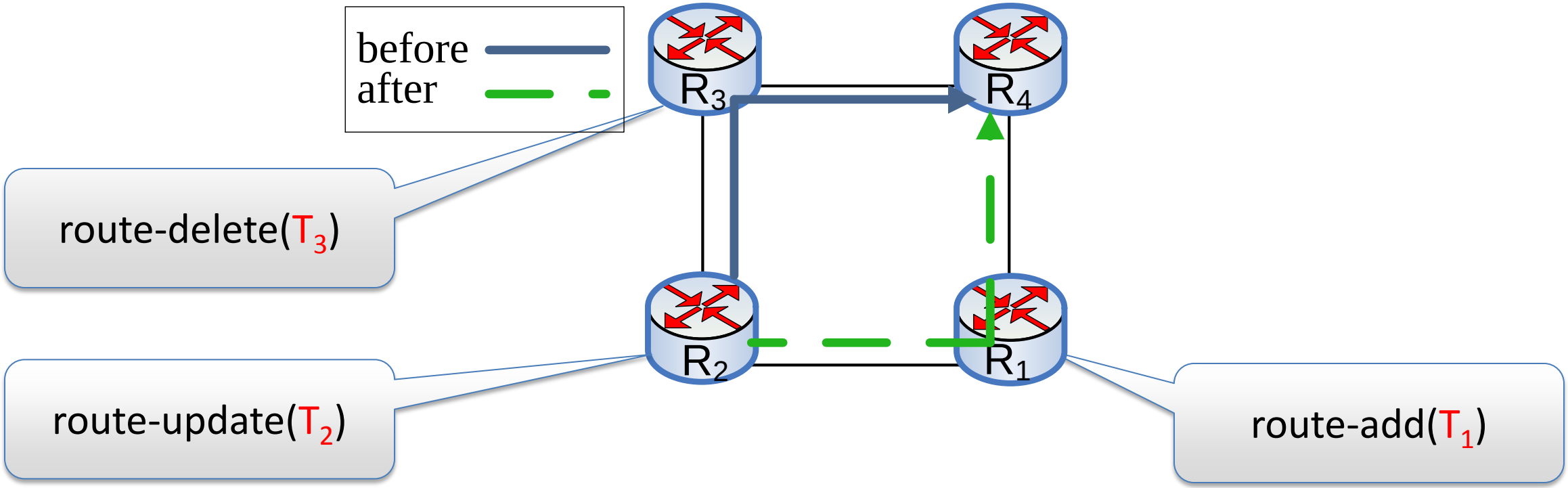


Example 2

A set of RIB updates that will switch from the ‘before’ to the ‘after’ paths.



Example 2



What if we can perform the RIB operations at times $T_1 < T_2 < T_3$ …?

So what is proposed here?

- Leverage the Time Capability in NETCONF.
  - RFC 7758 (Experimental).

- Timed RIB operations.

```
<rpc message-id="101">
    <route-add>
      ...
      ...
      ...

      <scheduled-time> 2016-11-16T07:15:00.235Z </scheduled-time>
   </route-add>
</rpc>
```

Next Steps

- Draft 00
- Feedback from the WG

Thanks!

Can timed operations be performed accurately?

Yes!

- Timed updates can be performed with a sub-microsecond accuracy using TimeFlips*.
- TimeFlip was tested on a Marvell 98DX4251 with a sub-microsecond accuracy.

* T. Mizrahi, O. Rottenstreich, Y. Moses, "TimeFlip: Scheduling Network Updates with Timestamp-based TCAM Ranges", IEEE INFOCOM, 2015.

References

[1] R. Enns, M. Bjorklund, J. Schoenwaelder, and A. Bierman, “Network configuration protocol (NETCONF),” RFC 6241, 2011.

[2] L. Wang, H. Ananthakrishnan, M. Chen, A. Dass, S. Kini, N. Bahadur, “A YANG Data Model for Routing Information Base (RIB)”, draft-ietf-i2rs-rib-data-model, work in progress, 2016.

[3] A. Atlas, J. Halpern, S. Hares, D. Ward, T. Nadeau, “An Architecture for the Interface to the Routing System”, RFC 7921, 2016.

[4] T. Mizrahi, Y. Moses, "Time Capability in NETCONF", RFC 7758, 2016.

[5] T. Mizrahi, Y. Moses, "OneClock to Rule Them All: Using Time in Networked Applications", IEEE/IFIP Network Operations and Management Symposium (NOMS), 2016.

[6] T. Mizrahi, O. Rottenstreich, Y. Moses, "TimeFlip: Scheduling Network Updates with Timestamp-based TCAM Ranges", IEEE INFOCOM, 2015.