Wide-Area Distributed Storage Acceleration using MPTCP

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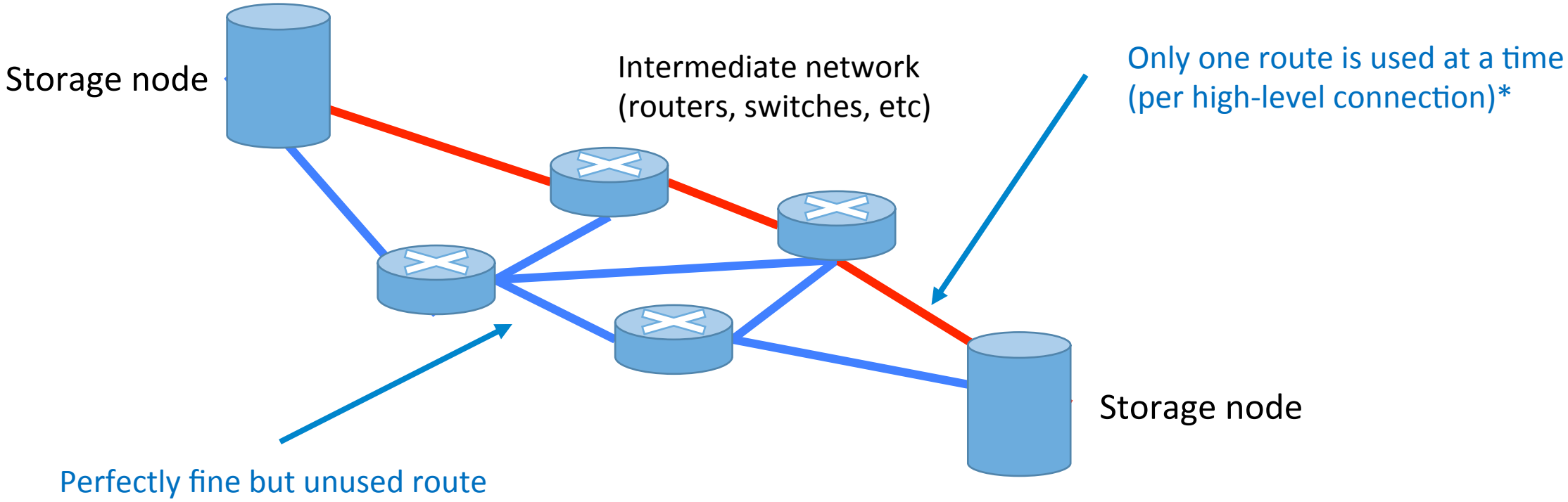
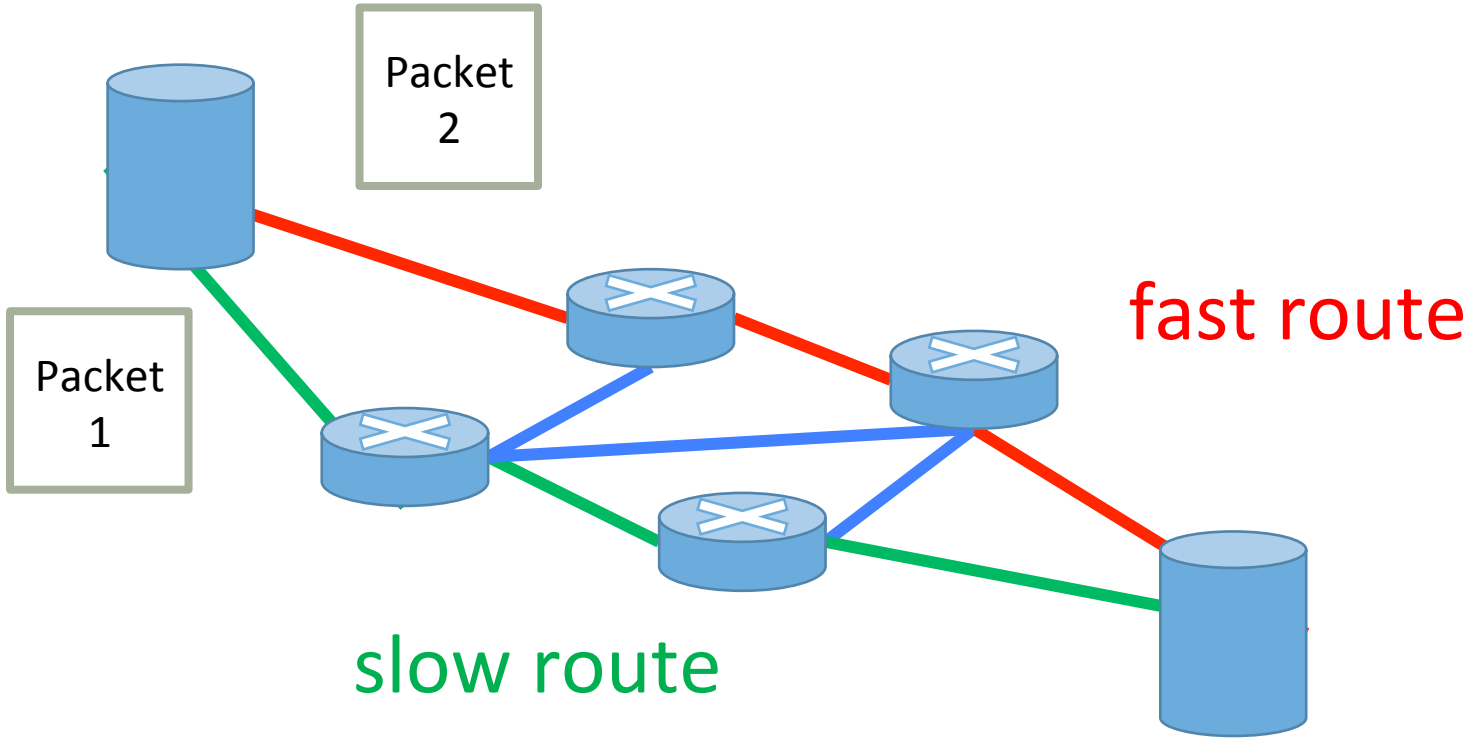
PACIFIC RIM APPLICATIONS AND GRID MIDDLEWARE ASSEMBLY PRAGMA

Distributed Storage doesn't function well when distributed over wide area.

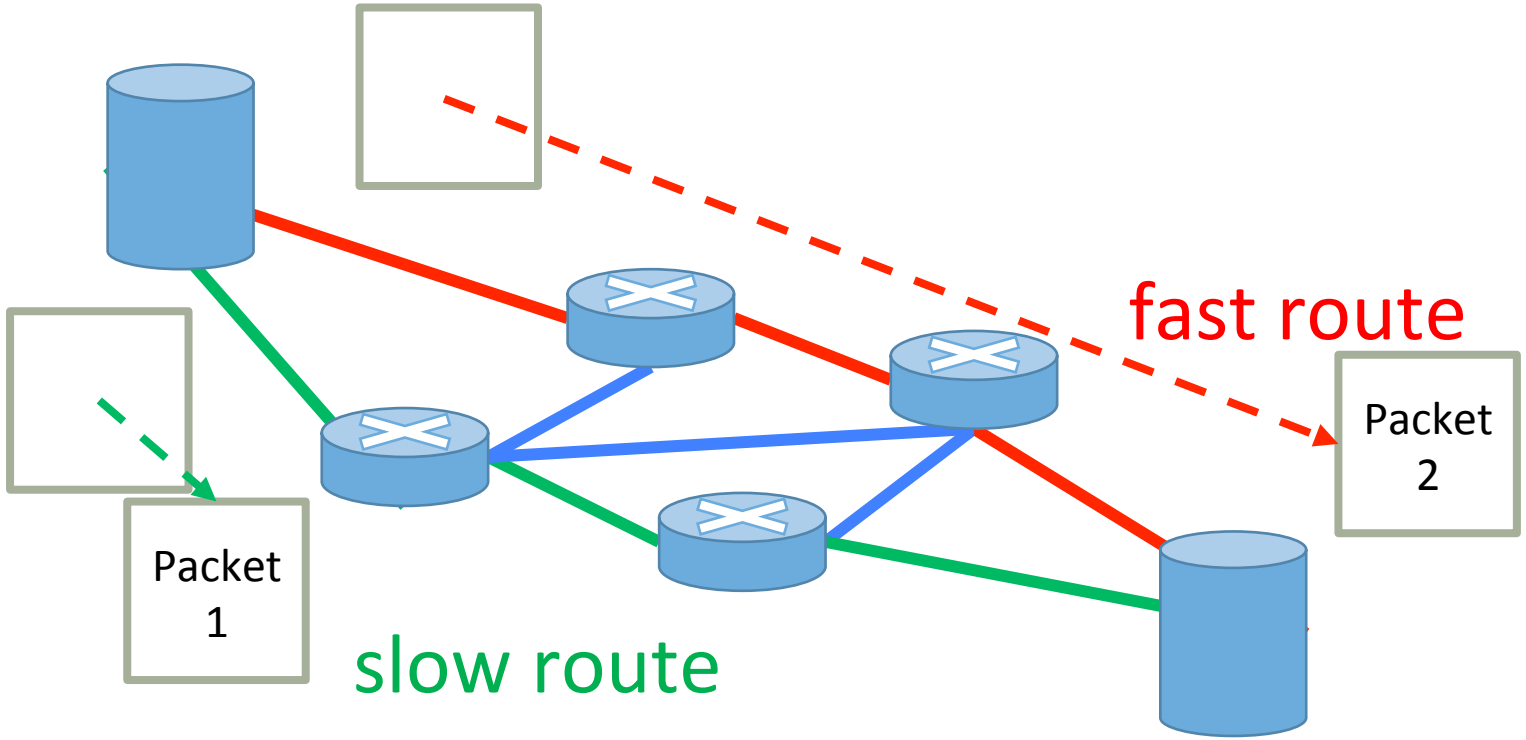


* Of course it depends on other configuration as well

Unequal links in WAN prevents use of low-layer load balancing …

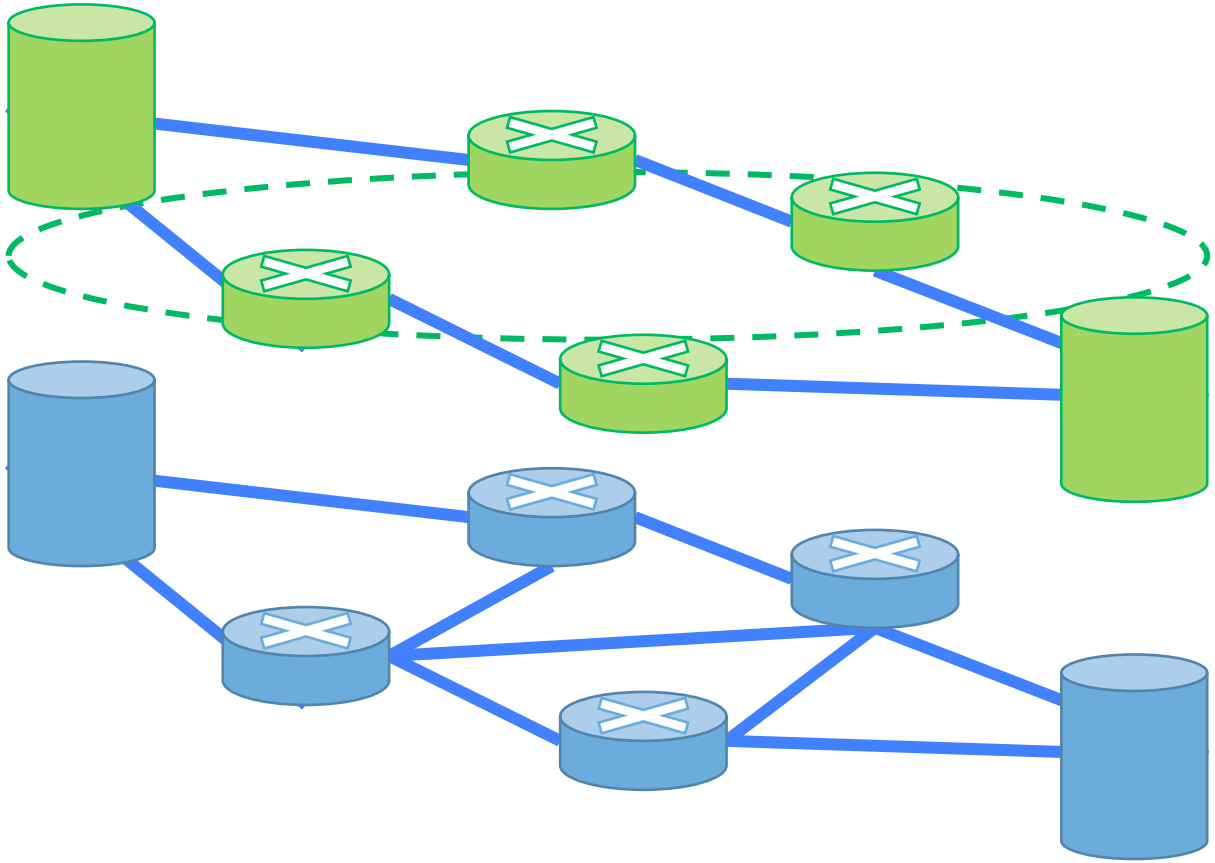


… due to problems like packet ordering.



There are other problems too.

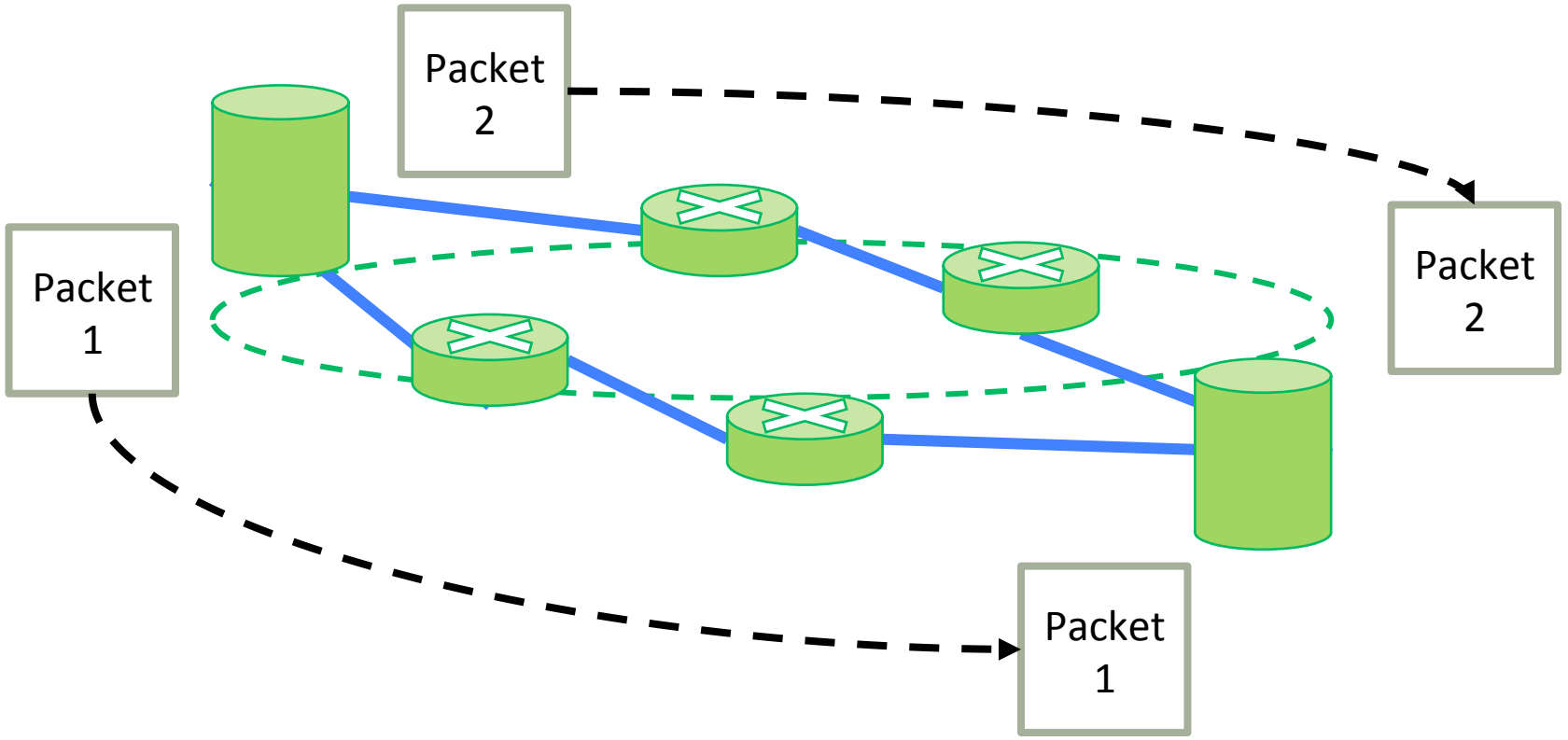
We plan to use SDN to create an overlay network.



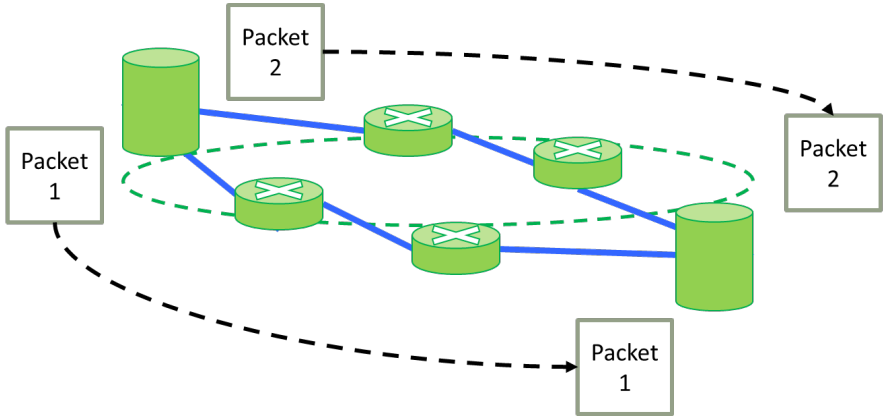
Overlay Network

Physical Network

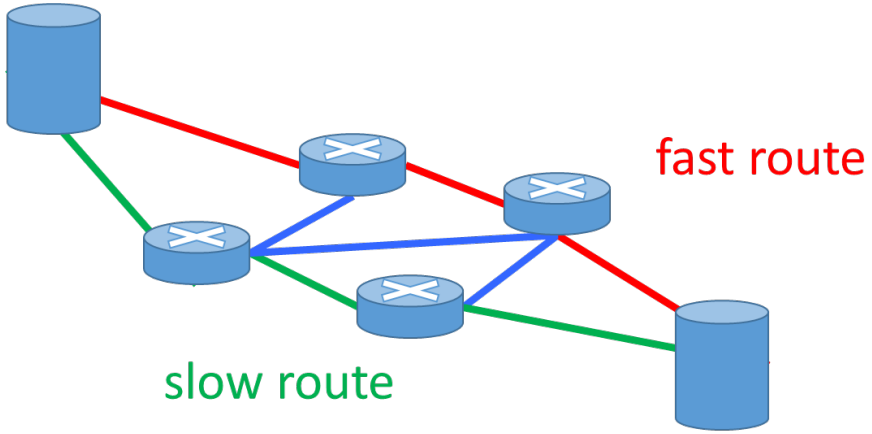
Then, use MPTCP to span the data transfer to multiple routes.



We expect:



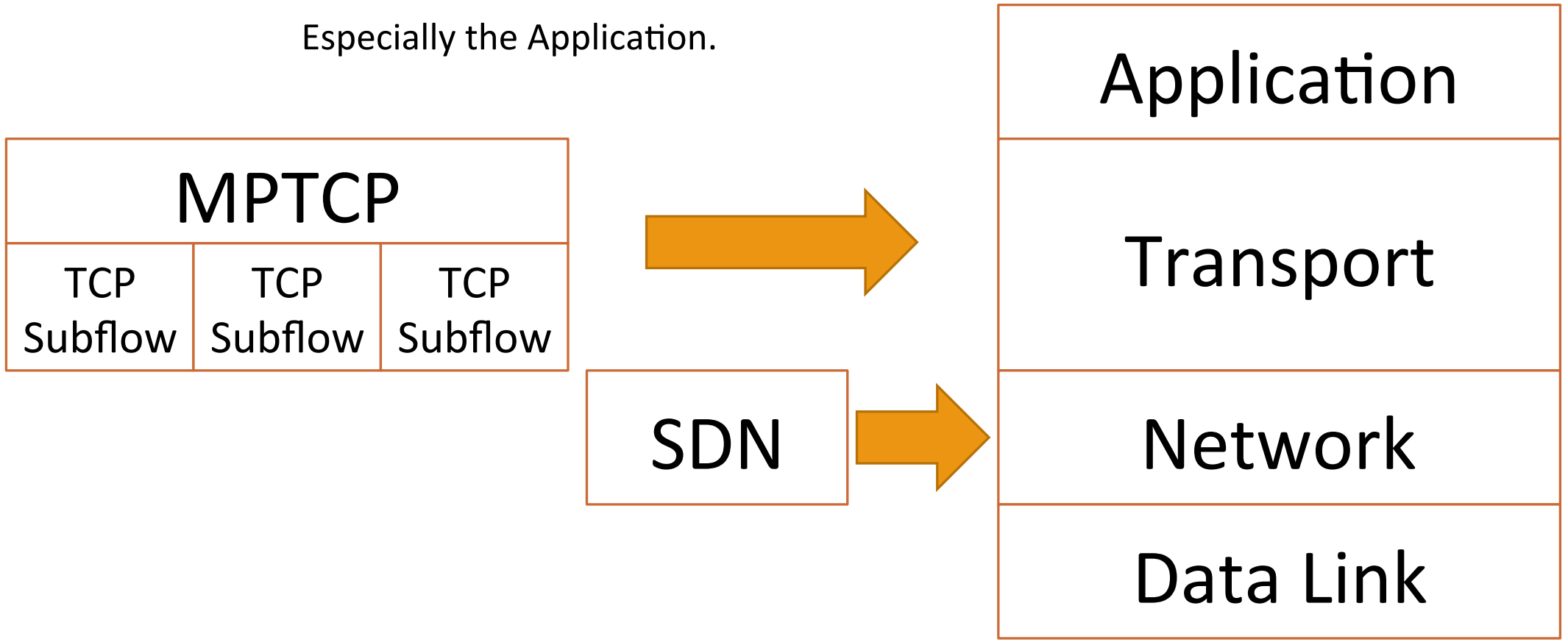
that in the end, MPTCP can increase data rate

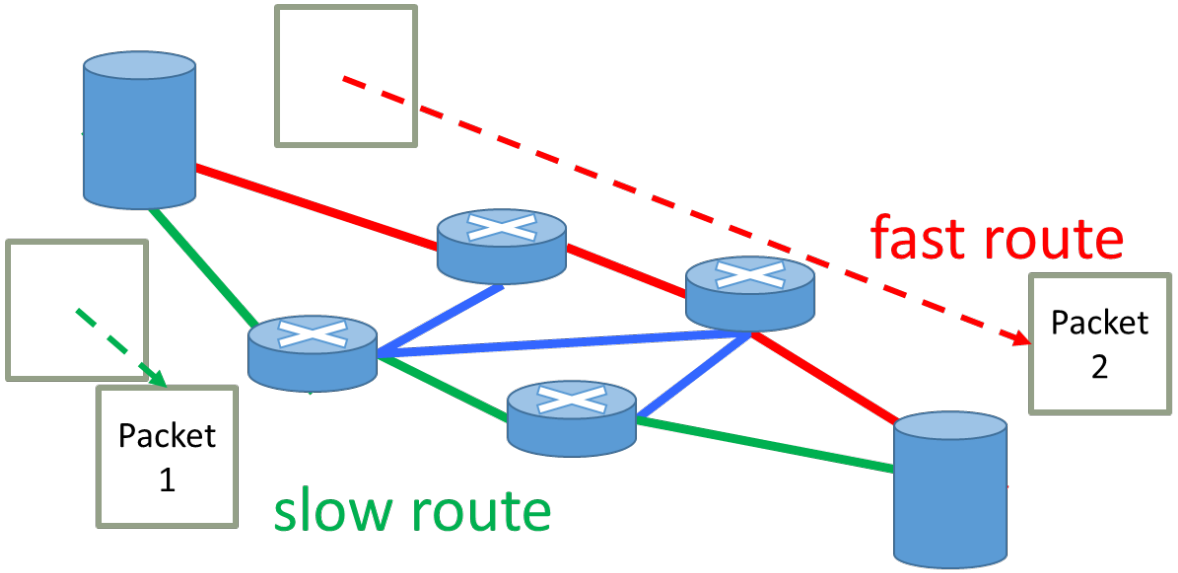


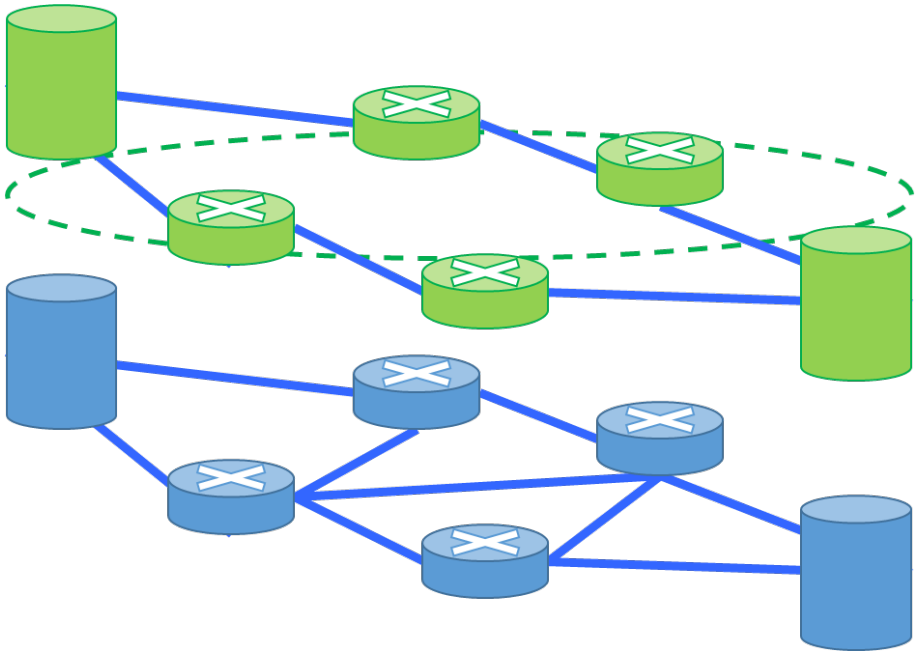
that we can use more routes thanks to SDN

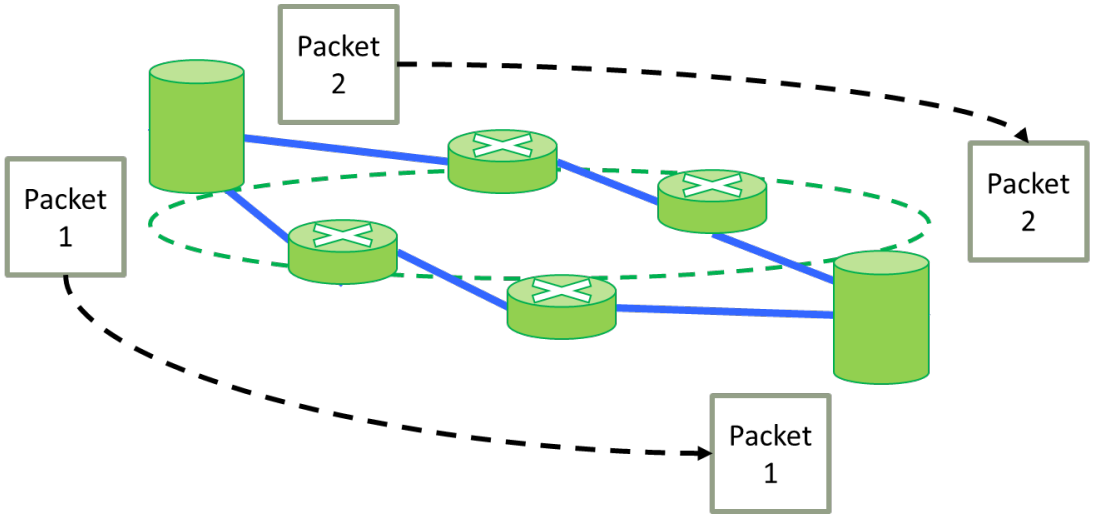
and: that we shouldn't have to modify anything else too much.

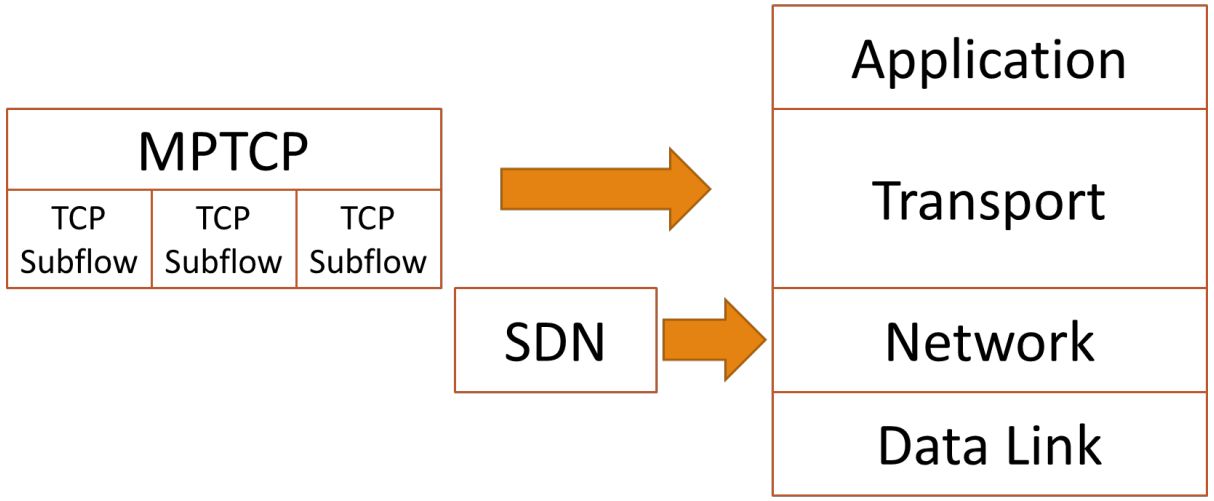
Especially the Application.




fast route
Packet 2
Packet 1
slow route




Packet 2
Packet 1
Packet 2
Packet 1


MPTCP
TCP Subflow
TCP Subflow
TCP Subflow
SDN
Application
Transport
Network
Data Link

Some challenges for MPTCP

* Availability
  - Very new, and few public implementations (iOS7)
  - MPTCP is not in Mainline Linux yet.
* Memory constraints
  - TCP requires memory to maintain connection state and transfer window
* Application-layer fine-tuning
  - Can applications get better performance if they manage MPTCP directly?(even if Transport is a layer separate from Application)

http://multipath-tcp.org/pmwiki.php?n=Main.50Gbps

Insanely fast data rate (not my work, link here)

10Gbps Ethernet x 6 links => 51 Gbps