



Software Defined Networking: ***Units of Evolution***

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**What does it mean to say SDN
changes the way networks evolve?**

Exciting!



But irrelevant.

Networks are evolving

Software Defined Networking,
especially in the OpenFlow model,
changes the networks'
unit of evolution.

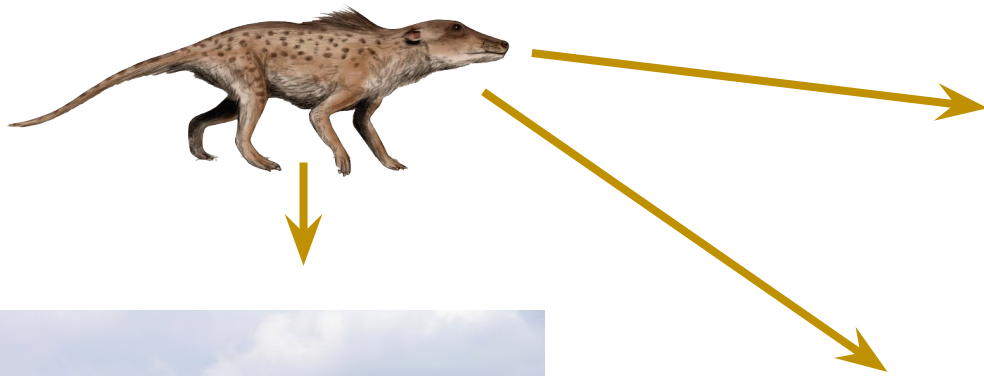
In evolutionary biology, the individual doesn't evolve...



...the unit of evolution is the *population*.



An ancestor population gives rise to others,
adapted for different niches.
This is *adaptive radiation*.



Giraffes

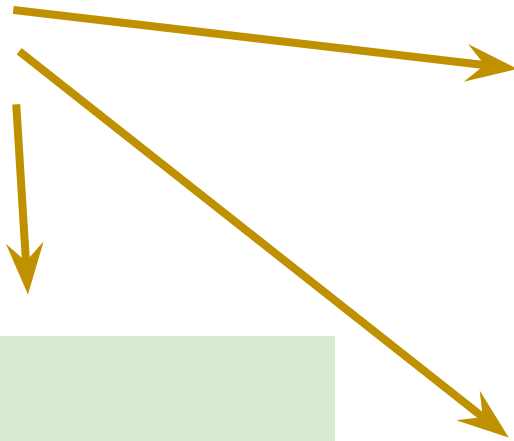


Impalas



Camels

Today, network devices have adapted to fill niches: *adaptive radiation* again.



Routers

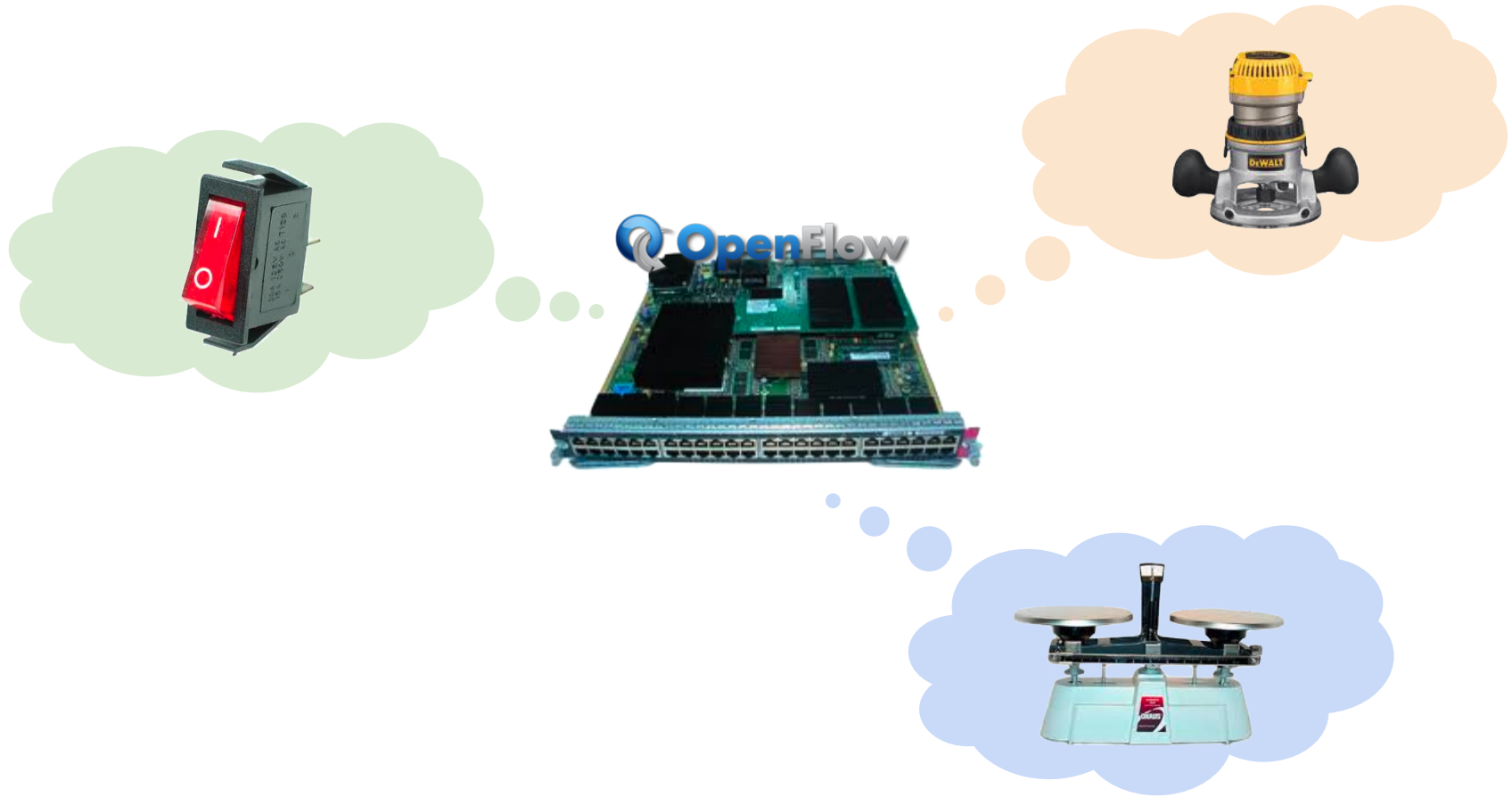


Switches

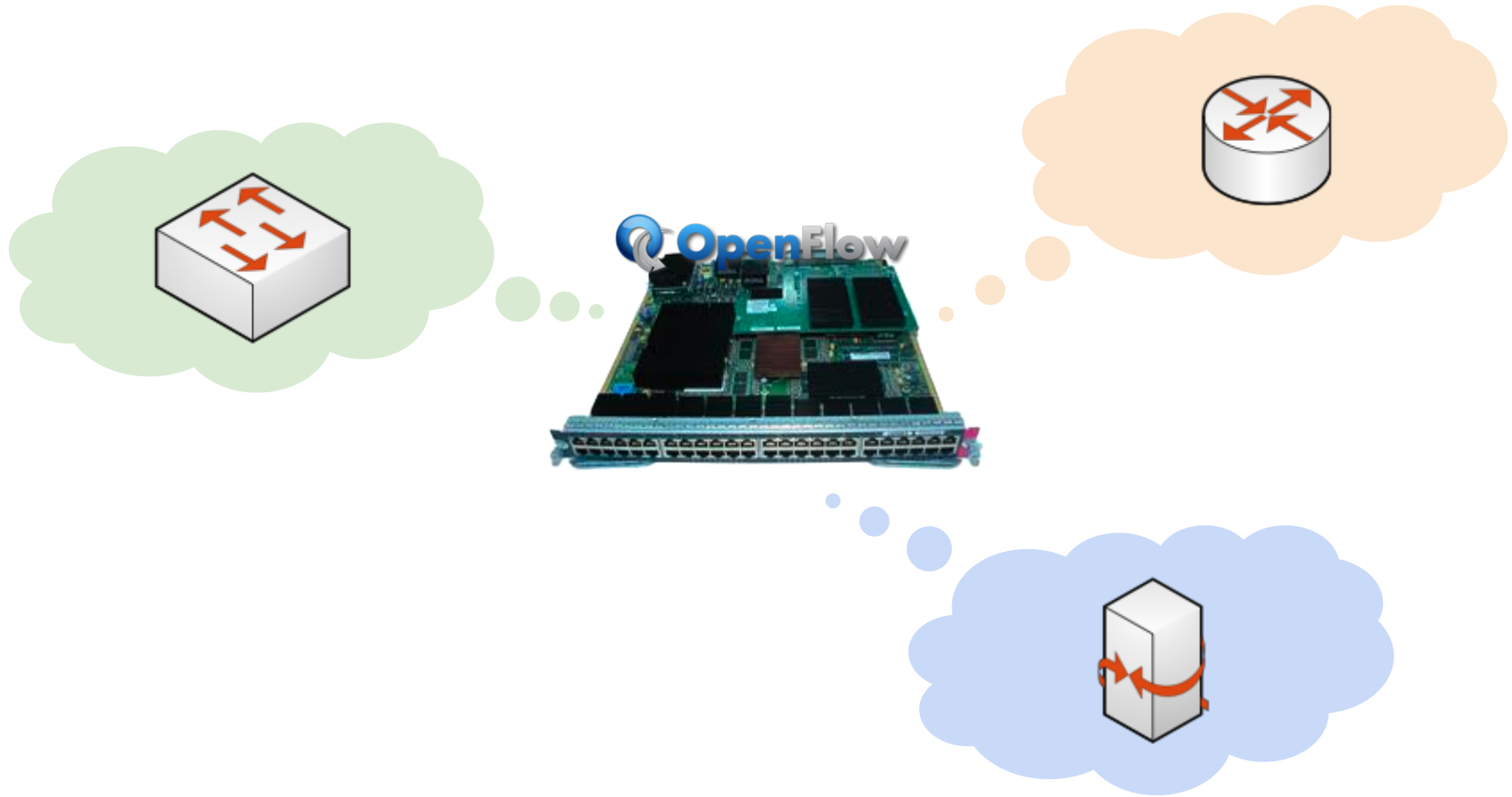


Load Balancers

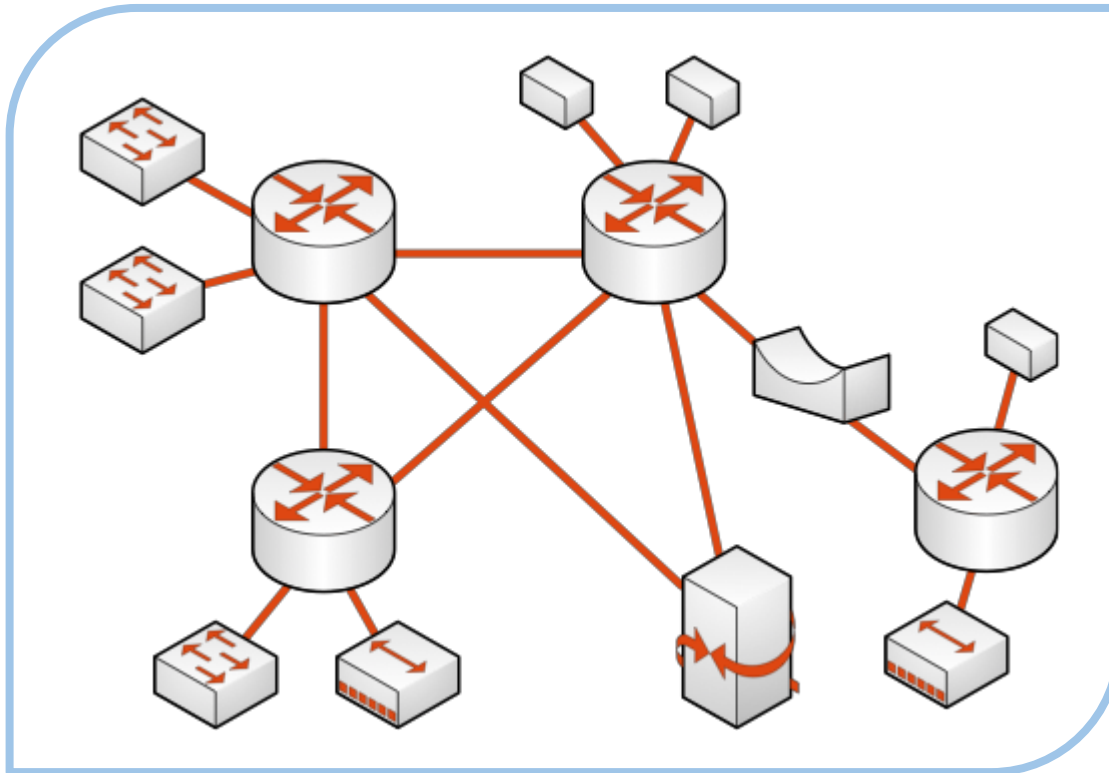
SDNs allow a network element to be any of these, or a bit of each, and to change over time...



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But the unit of evolution in an SDN world is different



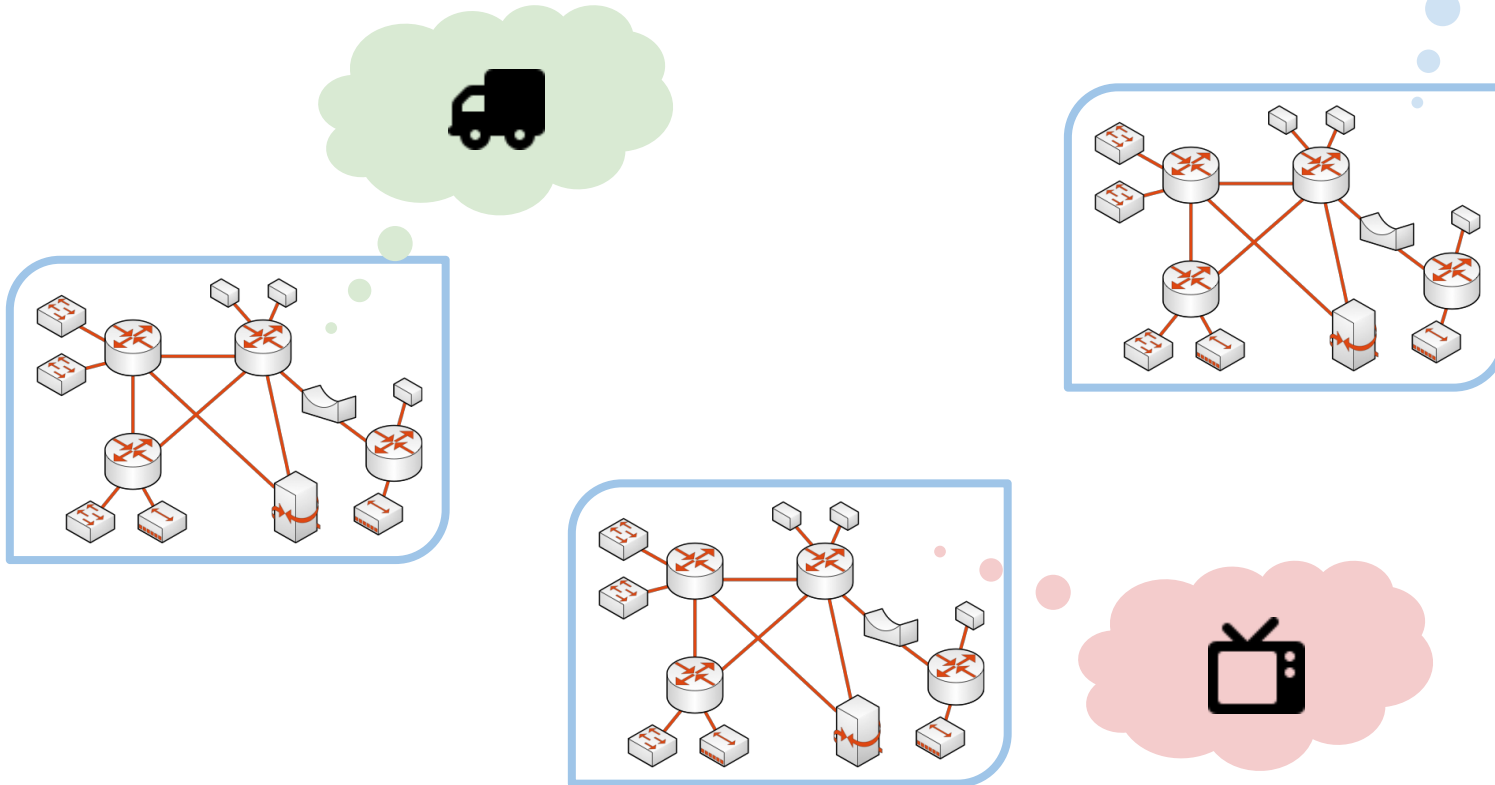
Today the fundamental optimality is shortest path



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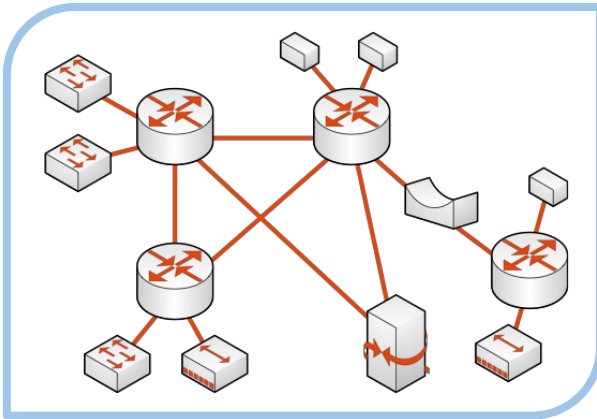
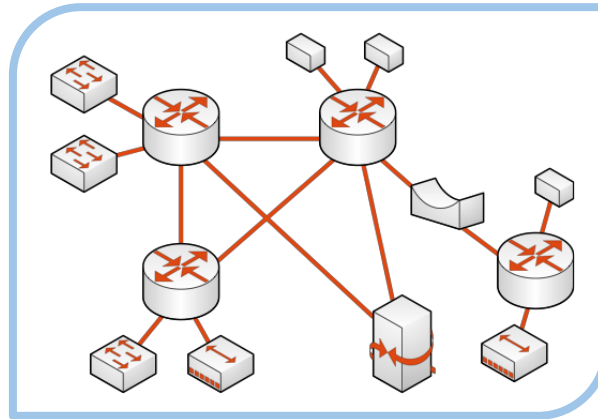
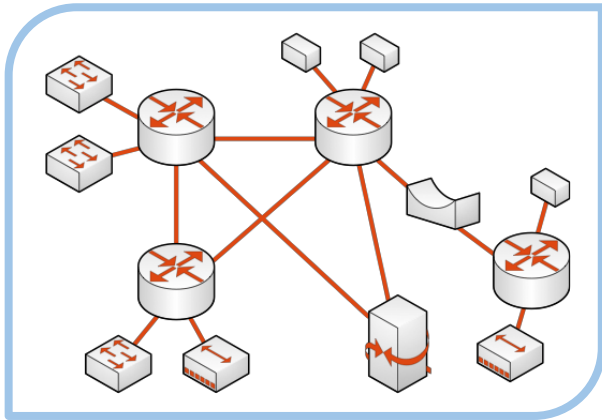
Applications = optimality



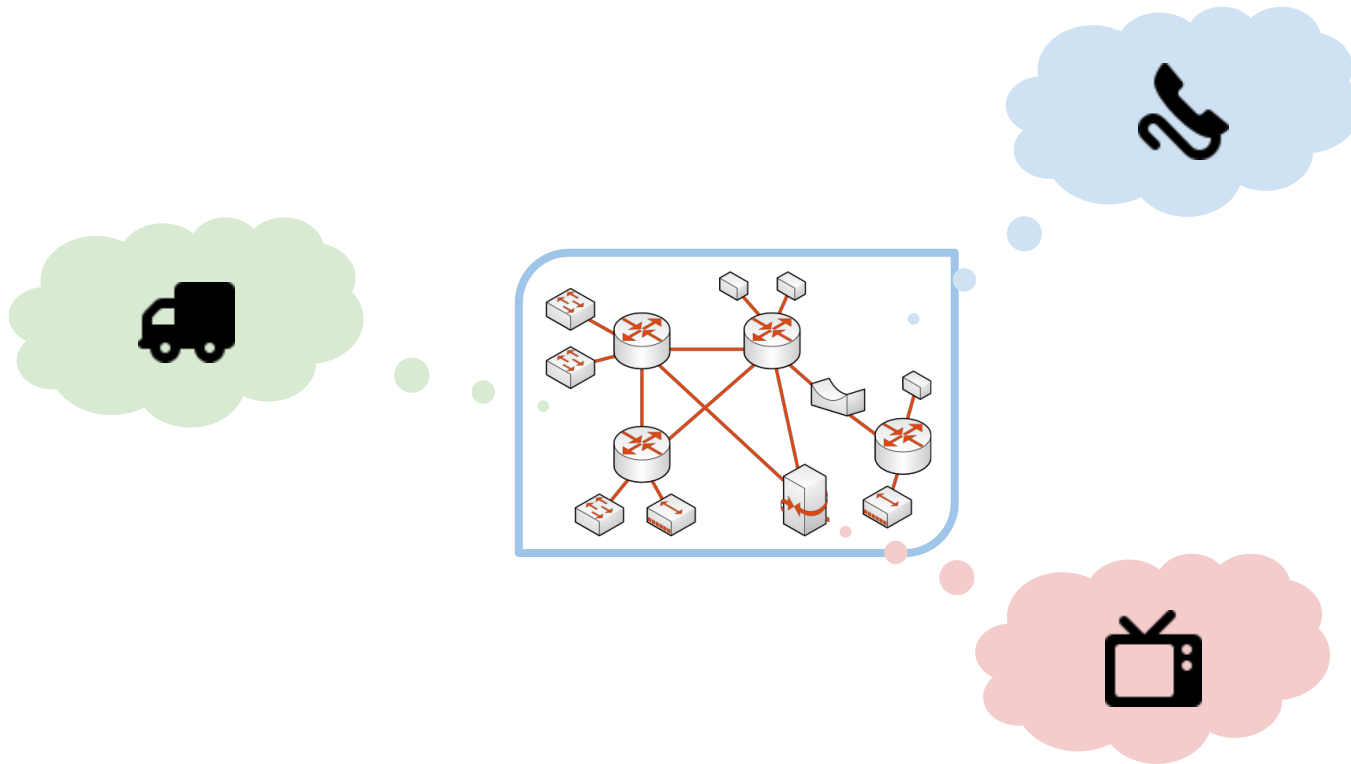
A practical example



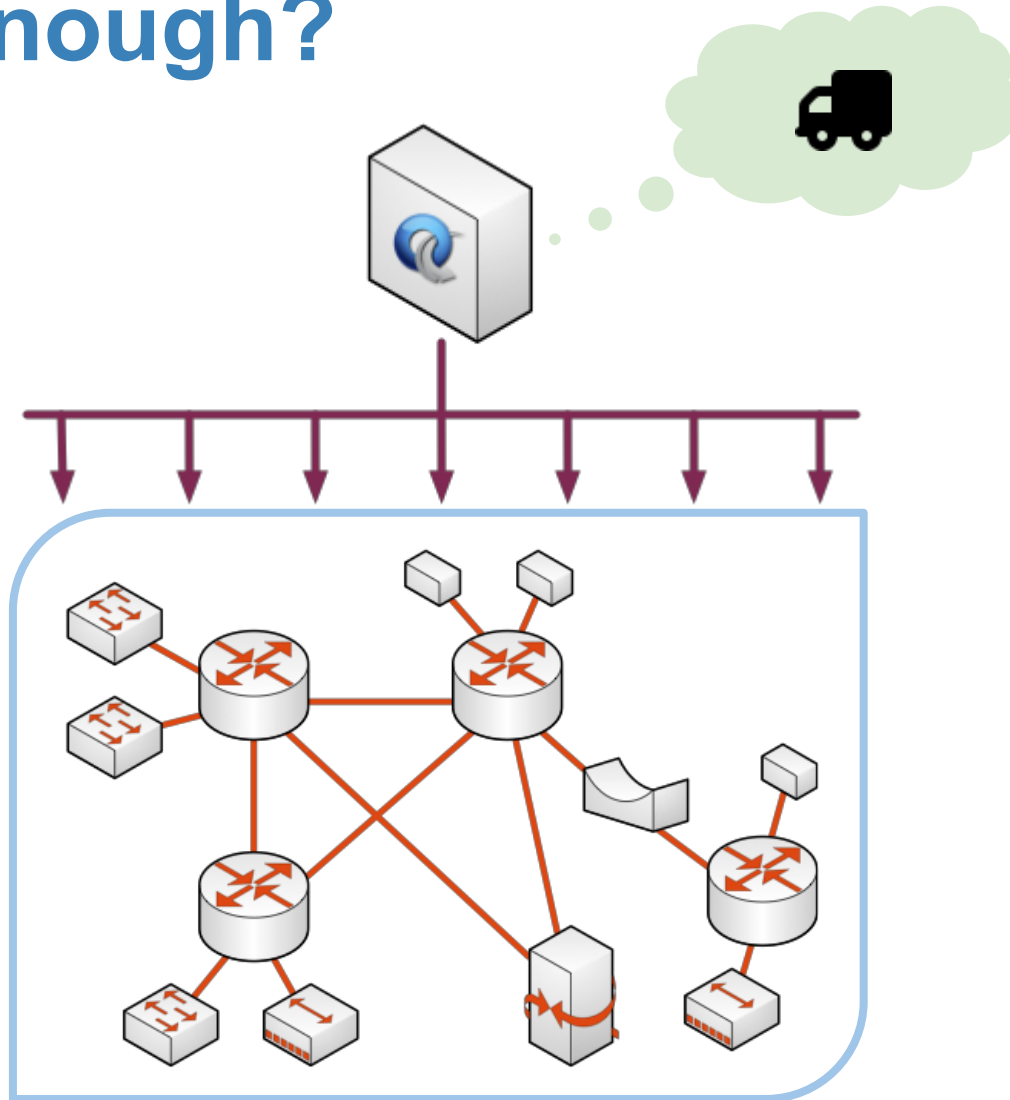
The population is a class of networks



Applications = optimality



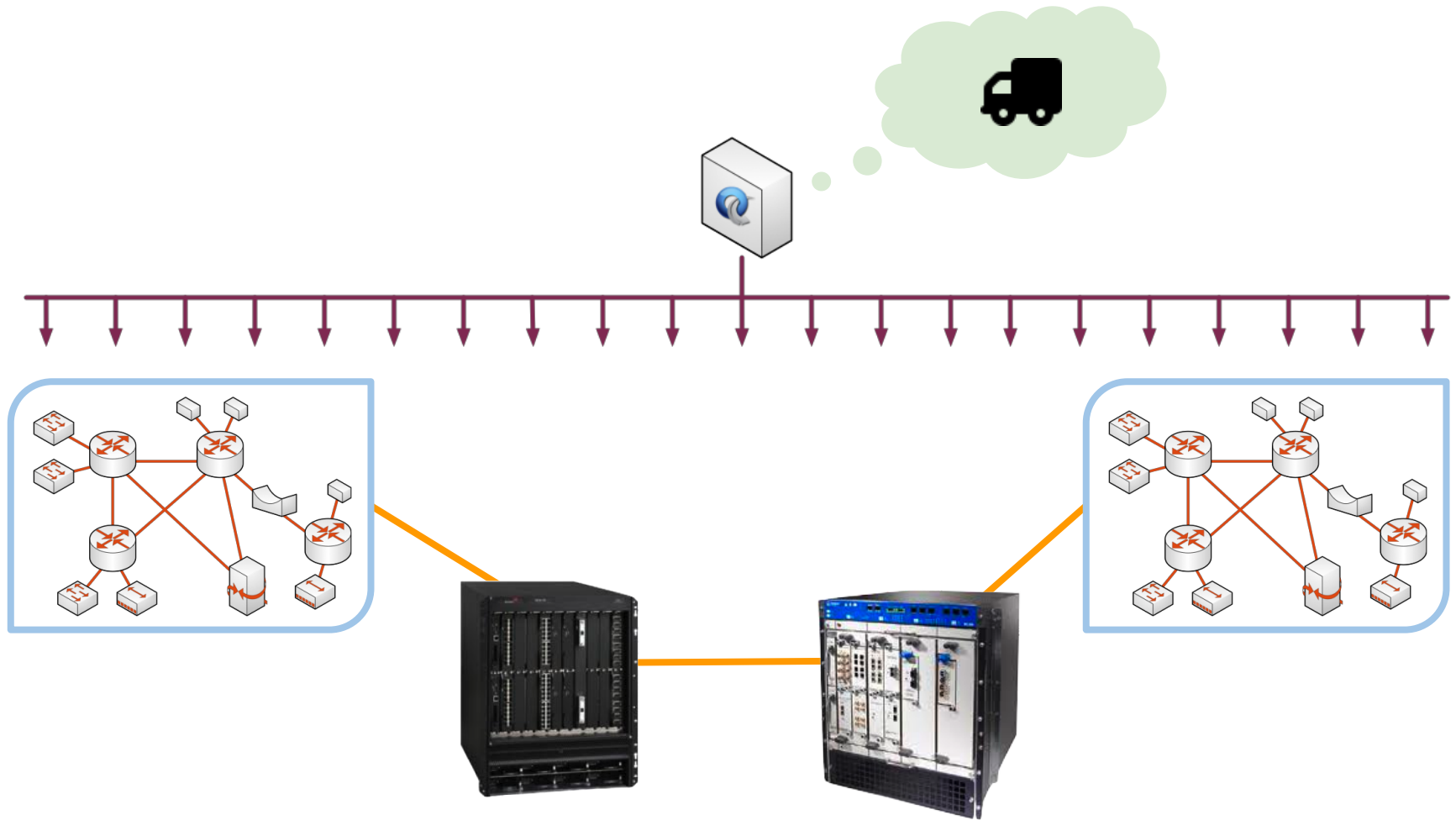
From practical to speculative - Is this enough?



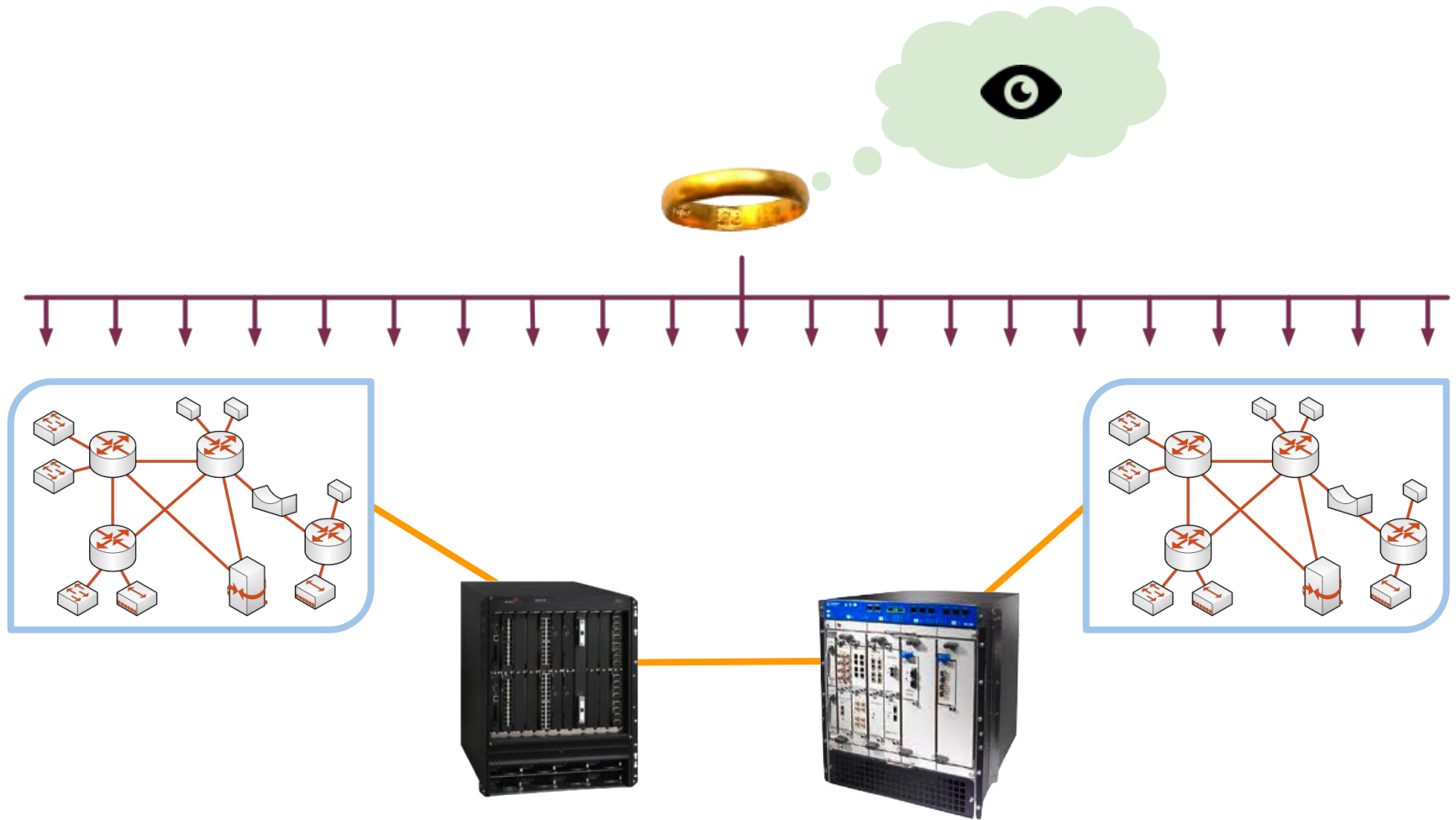
What about internetworking?



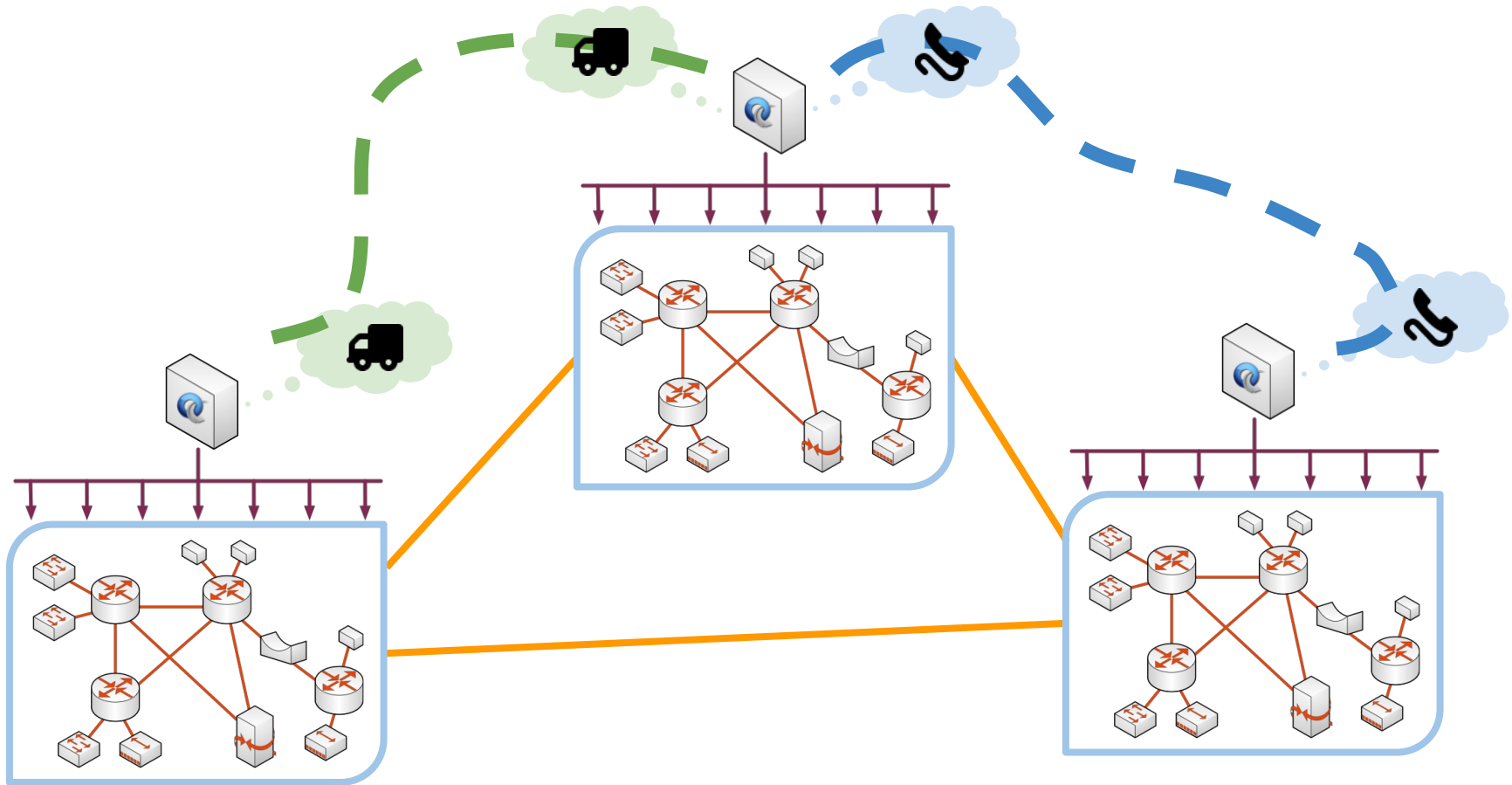
The single controller solution



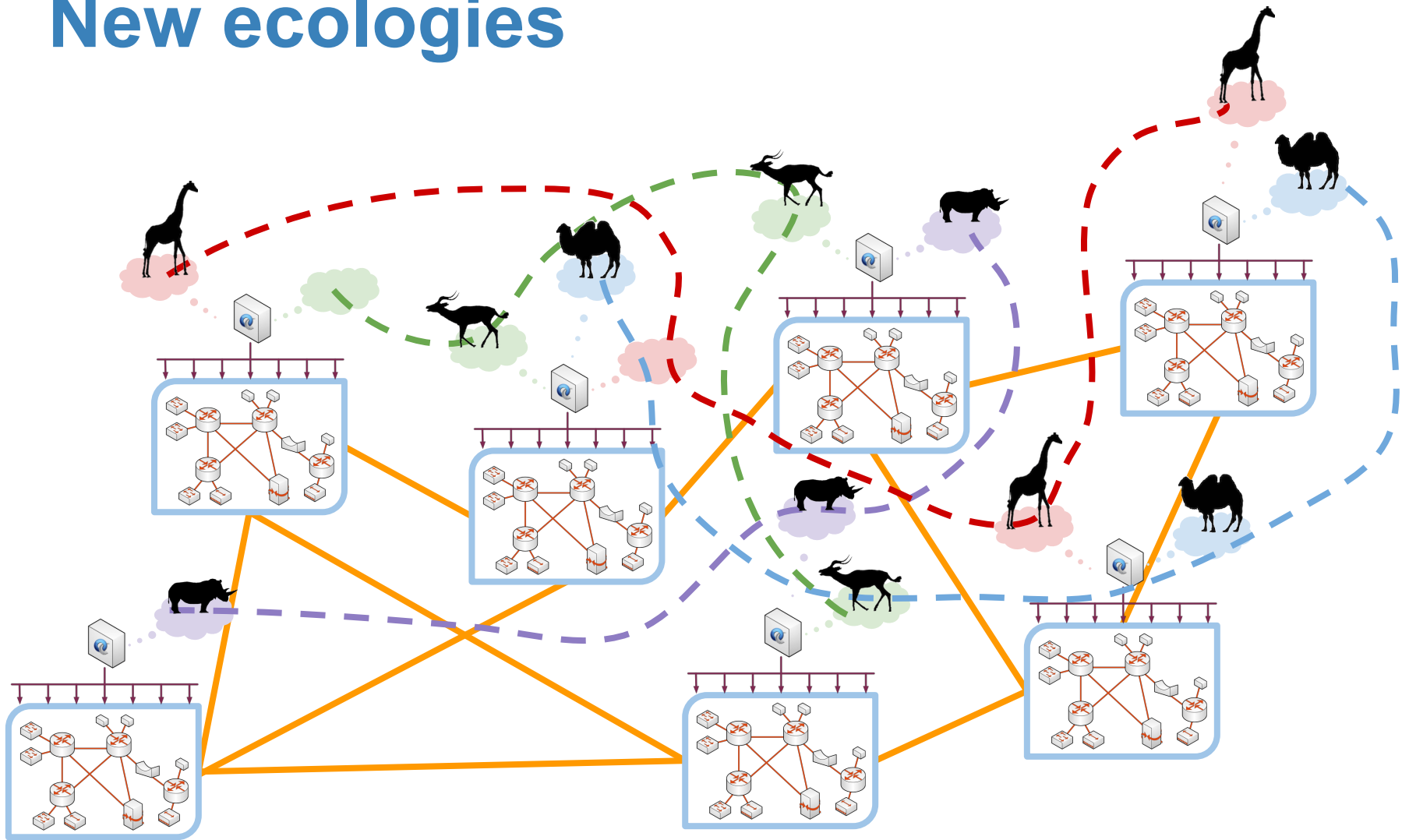
One ring to rule them all!



We need a distributed method for networks telling each other what application & optimality is running their network.



New ecologies



The End

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