



Architecting the Future Internet

# Business Models in Multipath World

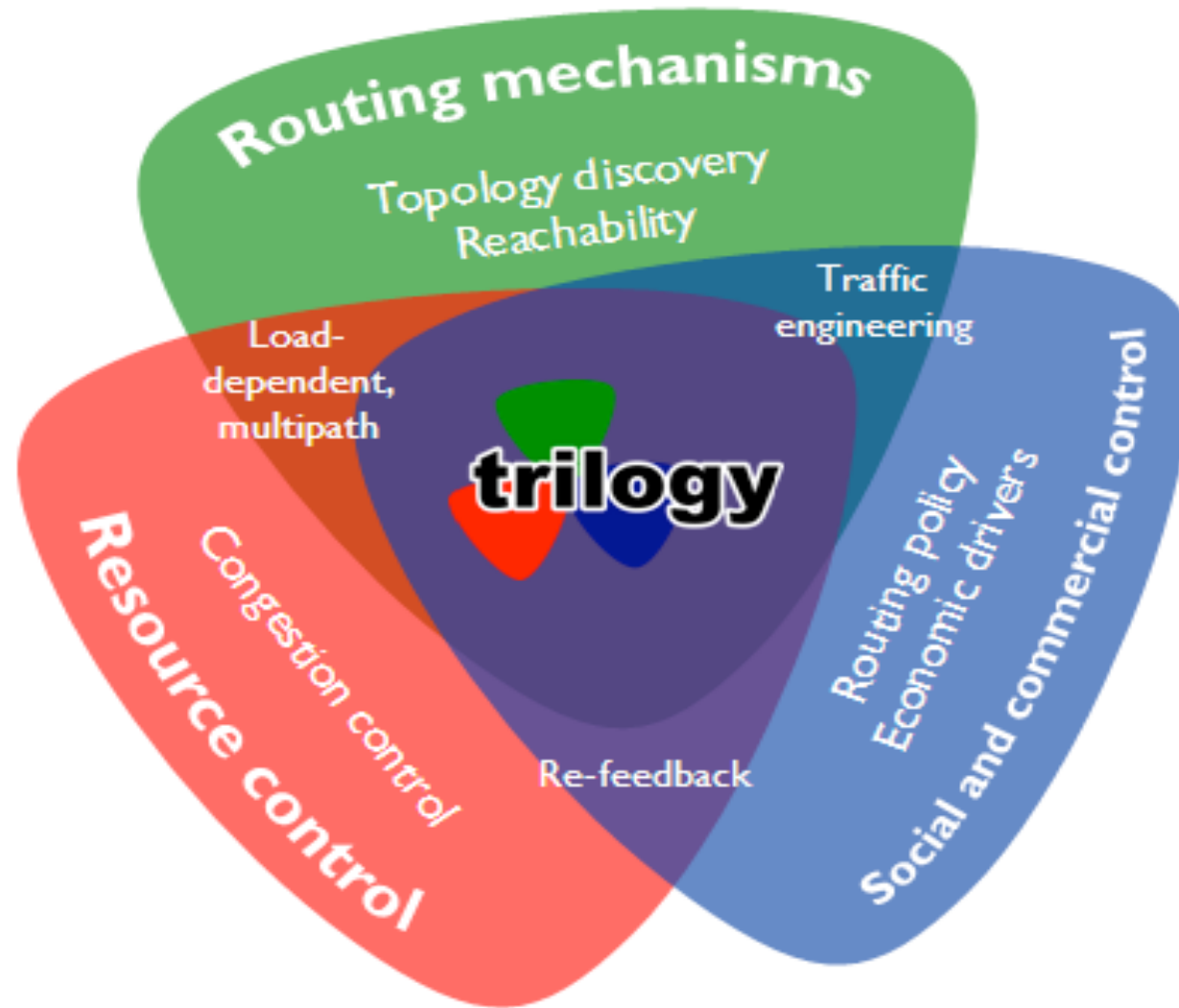
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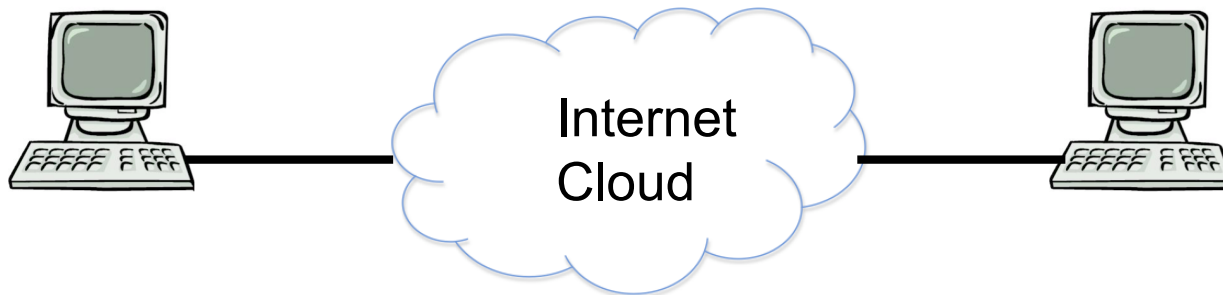
<http://trilogy-project.org>

# Trilogy project



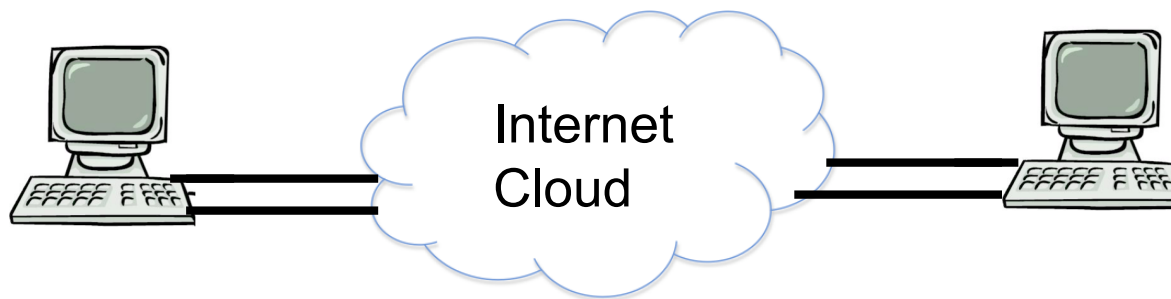
# Transmission Control Protocol, TCP

- One of the core protocols on the Internet
- Provides a reliable delivery of data streams
- Congestion control
- Currently works over a single path



# Multipath TCP, MPTCP

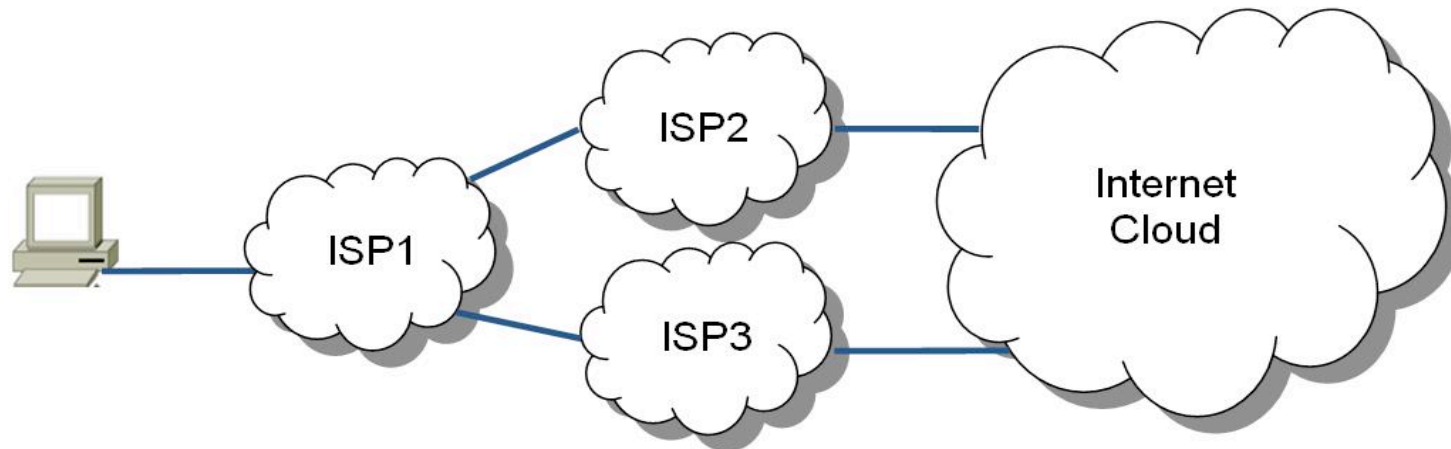
- The traffic of a TCP connection is spread on multiple paths between the end-points
- Improves the resilience of the network connection
- Enables better utilization of the network resources



# Business aspects of multipath TCP deployment

# SCENARIO 1

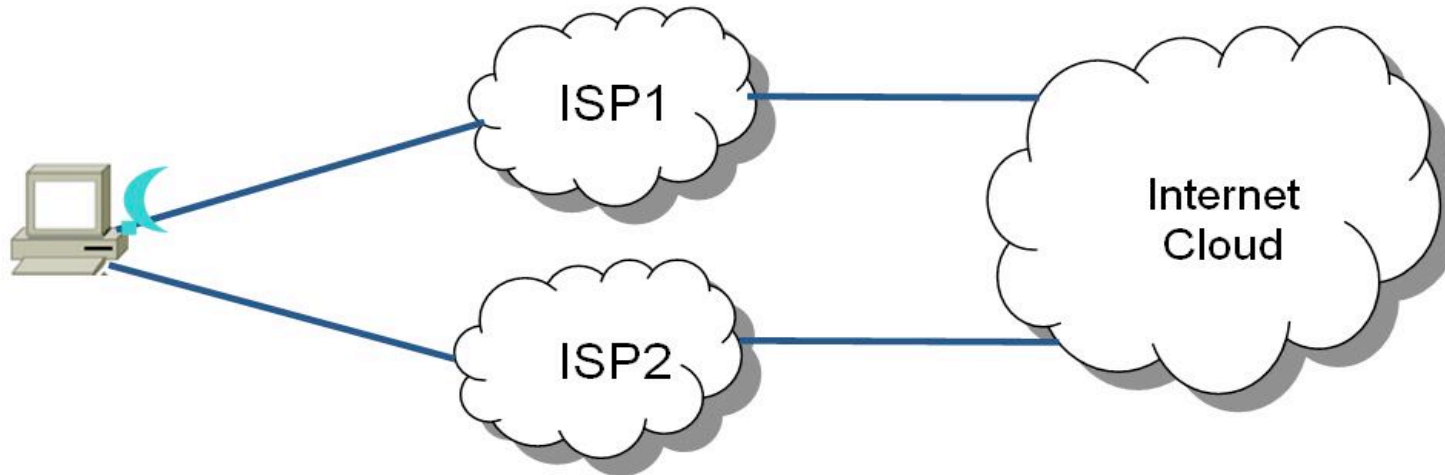
End-user has one physical connection to the ISP



- MPTCP benefits are highly dependent on ISP performance
- ISP can offer MPTCP upgrade as a premium feature

## SCENARIO 2

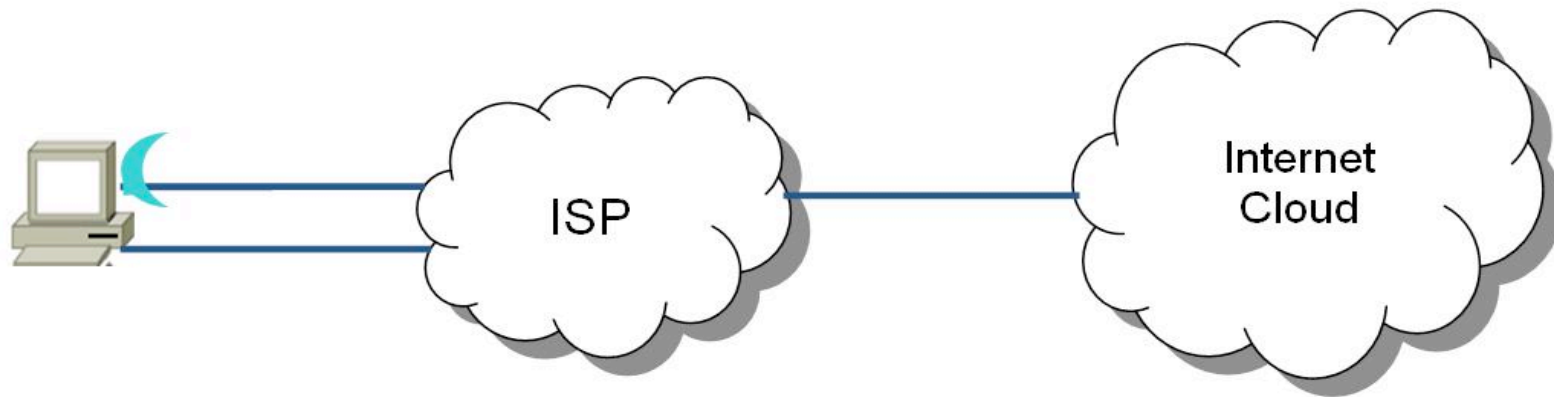
End-user has multiple physical connections to multiple ISPs



- Gives more bargaining power to the end-user but entails a burden of handling multiple contracts
- Possible new service provider: Virtual Multipath Operator

# SCENARIO 3

End-user has multiple connections to a single ISP



- ISP can develop lucrative access connection bundles which enables multihoming



# End-user SWOT analysis of Scenario 3

<b>Strengths</b> <ul style="list-style-type: none"><li>- Transparency of link performance</li></ul>	<b>Weaknesses</b> <ul style="list-style-type: none"><li>- Increased cost for double access and provision of disjoint MPTCP connectivity</li></ul>
<b>Opportunities</b> <ul style="list-style-type: none"><li>- More reliable and higher network throughput</li><li>- Redundancy through different access technologies</li></ul>	<b>Threats</b> <ul style="list-style-type: none"><li>- ISP may be bottleneck</li></ul>

# ISP SWOT analysis of Scenario 3

<b>Strengths</b> <ul style="list-style-type: none"><li>- Existing customer relationship will be fully maintained</li><li>- Provider lock-in can be increased</li></ul>	<b>Weaknesses</b> <ul style="list-style-type: none"><li>- Full benefits of MPTCP require offering routing functionalities</li></ul>
<b>Opportunities</b> <ul style="list-style-type: none"><li>- Warranty of reliable throughput can be charged</li><li>- Load balancing between the links</li></ul>	<b>Threats</b> <ul style="list-style-type: none"><li>- Possible visibility of bad performance</li><li>- Customers may not be willing to pay double price for dual access</li></ul>

# Conclusions

- MPTCP is a relatively small technical change but its effect on business models may be remarkable
- Introducing MPTCP is especially attractive while multihoming capability already exists
- Different scenarios attract different types of end-users
- Although the ISPs are not necessarily required to have technical involvement they can support the deployment of MPTCP

Questions?  
Comments?

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