Benefits of coordinated congestion control

Business Models in a Multipath World

Although Multipath TCP is a mere technical change to the TCP protocol providing improved resilience and throughput, it will have considerable impact on the value networks and business models of Internet access provisioning.

Business models and value networks

Organization of the value network depends on the way end-users choose to set up their access links. Some potential use cases, i.e. technical architectures and the corresponding value networks, are listed below.

Key stakeholders: End-users and ISPs

End-user
• Consumer
• User
• Content provider

ISP

Internet Cloud

Potential MPTCP Use Cases
1. End-user with single physical access to one ISP
   A. ISP splits the traffic via a proxy
   B. ISP provides multiple sessions over one access link
2. End-user with dual physical access to one ISP
   A. Mobile terminal with two access technologies (3G and WLAN)
   B. Disjoint connectivity (such as two DSL lines) to single ISP
3. End-user with dual physical access to different ISPs
   A. Mobile terminal with two access technologies (3G and WLAN)
   B. Disjoint connectivity (such as two DSL lines) to multiple ISPs
4. End-user with physical access to multiple ISPs but with one contract to a Virtual Multipath Operator

What is Multipath TCP?

Multipath TCP (MPTCP) is one manifestation of resource pooling principle. MPTCP allows multiple paths between endpoints to be used simultaneously so that they appear to the application as a single transport connection. This is achieved through dynamic scheduling of traffic across available paths.

Benefits: improved resilience and higher bandwidth

Resource Pooling

The resource pooling principle improves use of the Internet’s resources by allowing separate resources act as if they were a single large resource.

Example use case: 3.A MPTCP capable mobile terminal with multihomed access to multiple ISPs

In this use case end-user multihomes, i.e., has two physical access connections to two different ISPs. More specifically, the ubiquitous 3G connectivity of a mobile terminal is supplemented by high WLAN bandwidth when available.

End-user perspective: MPTCP allows more efficient usage of the device capabilities. Additionally, MPTCP offers seamless handover of sessions between different access connections.

ISP perspective:

• Ownership of at least one customer access line
• Ability to provide multipath without involvement of a second ISP
• Good network performance visible to end-users and may become chargeable
• Additional revenue through multihoming of prior sole ISP2 customers

Weaknesses
• Inability to provide multipath without involvement of a second ISP
• Bad network performance visible to end-users and may lead to churn
• Customers want to pay less for individual access when they need two for full multihoming

Next steps

• Use case analysis by using SWOT and Porter’s five forces
• Adoption models of MPTCP
• User incentives of switching from classic TCP to MPTCP
• Benefits of coordinated congestion control