Designing Optimal iBGP Route-Reflection Topologies

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Résumé en anglais	The Border Gateway Protocol (BGP) is used today by all Autonomous Systems (AS) in the Internet. Inside each AS, iBGP sessions distribute the external routes among the routers. In large ASs, relying on a full-mesh of iBGP sessions between routers is not scalable, so route-reflection is commonly used. The scalability of route-reflection compared to an iBGP full-mesh comes at the cost of opacity in the choice of best routes by the routers inside the AS. This opacity induces problems like suboptimal route choices in terms of IGP cost, deflection and forwarding loops. In this work we propose a solution to design iBGP route-reflection topologies which lead to the same routing as with an iBGP full-mesh and having a minimal number of iBGP sessions. Moreover we compute a robust topology even if a single node or link failure occurs. We apply our methodology on the network of a tier-1 ISP. Twice as many iBGP sessions are required to ensure robustness to single IGP failure. The number of required iBGP sessions in our robust topology is however not much larger than in the current iBGP topology used in the tier-1 ISP network.
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