Stronger Necessary Conditions for the Existence of a Compatible OSPF Metric

Broström, Peter *(Linköping Institute of Technology, Sweden)*
Holmberg, Kaj *(Linköping Institute of Technology, Sweden)*

This presentation is a continuation of the presentation "Determining the Non-Existence of a Compatible OSPF Metric". It addresses the question of whether or not for a set of desired traffic patterns in an Internet Protocol telecommunication network using OSPF (Open Shortest Path First), there exists a compatible metric, i.e. weights making the routers give the specified traffic patterns. In the previous presentation it was shown that the existence of what we here call 1-valid cycles prove the non-existence of a compatible metric. In a 1-valid cycle the flow of two commodities is changed in a cycle. We here prove that a 2-valid cycle, which is a cycle in which more than two commodities are changed, exists if and only if there exists a 1-valid cycle. Furthermore, a 3-valid set of cycles is defined as a set of cycles where the flow of one commodity is changed in each cycle. Unfortunately we have not been able to show that the non-existence of 3-valid sets of cycles is sufficient for the existence of a compatible metric. However, for some special cases, such as when the desired traffic patterns only consist of a number of trees, stronger results are obtainable. Since it is fairly easy to find 1-valid cycles, we also consider the case when we know that there does not exist any 1-valid cycle.

An alternate title of this talk is "In Search of Sufficient Conditions for the Existence of a Compatible OSPF Metric". We can formulate sufficient conditions for the existence of a compatible metric, but at the moment this formulation is not practically usable. However, this talk aims to show that the gap between the necessary and sufficient conditions is decreasing.