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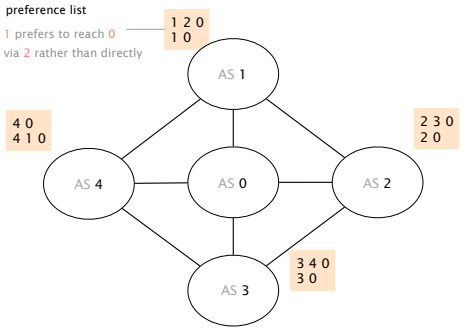
Communication Networks

Exercises week 11 – Routing Policies and Security

Convergence



Does this network ever converge?

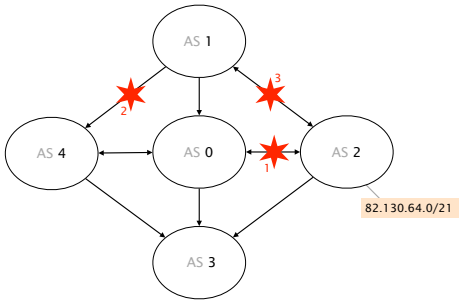
Consider this BGP network composed of 5 ASes. Each AS is assigned with a list of paths which indicates its preferences to reach AS 0.

Considering that only AS 0 originates prefixes, does that BGP network have a unique, stable solution?

a) If yes, indicate the path that each AS selects in the stable solution.

b) If not, describe an example of oscillation. For instance, by describing a sequence of messages that repeats itself.

Not-so-reliable Internet



Which messages are exchanged?

Consider now the same BGP network composed of 5 ASes but assuming customer-provider and peer-to-peer policies. Providers are connected to their customers with a single-headed arrow pointing to their customers (AS 1 is the provider of AS 4), while peers are connected with double-headed arrows (AS 1 and AS 2 are peers).

Assume that AS 2 is the only one to advertise an IPv4 prefix: `82.130.64.0/21` (to *all* its neighbors) and that the Internet has converged. Which BGP messages are exchanged after the following events happen, one after the other:

a) the link between AS 0 and AS 2 fails (event 1):

b) the link between AS 1 and AS 4 fails (event 2):

c) the link between AS 1 and AS 2 fails (event 3):

Is the network still connected at the end? If not, list the ASes that cannot reach the prefix anymore.

Peering war

Consider two ASes, say ATT and Google, which are peering with each other in multiple locations (using a peer-peer relationship). Oftentimes, peering agreements include a clause that mandate peers to announce BGP routes with the same AS-PATH length at *every* peering location. Explain why this clause makes sense.