A type of network optimization problem Arise in many different contexts (CS): Networks: routing as many packets as possible on a given network Max Flow Min CutTheorem. Proof. We provide algorithms, prove the maximum ow minimum cut theorem, and begin to discuss applications 1 Max-Flow Problem. We provide algorithms, prove the maximum ow minimum cut theorem, and begin to discuss A very clean way of formulating the maximum ow problem is to think in terms of the paths along which we are going to send the ow, rather than in terms of how much ow is In the max-ow problem, our goal is to nd the ow with the maximum value. Maximum Flow Problem In a directed graph with source vertex s, sink vertex t, and non -negative arc capaicities, find a maximum flow from sto t Today we continue discussion on the Maximum Flow Problem { to nd the maximum s t ow on a graph. (Max-flow Min-Cut). We start with an arbitrary flow. We will consider directed graphs of the form G = (V; E; c), where each edge eE of the graph has a capacity given by t. That is, we want to nd the best way to send trucks from s to tMax ow min cut An s-t cut is a partition The Maximum Flow Problem. e f A flow for a network N is said to be maximum if its value is the largest of all flows for N. The maximum flow problem consists of finding a maximum flow for a given network N/6 v 1////3 w 3///9 • The Ford-Fulkerson method is the standard method for solving a maximum-flow problem. We'll show that the procedure that we gave last lecture { by keep nding a In this lecture we continue our discussion of the maximum ow problem. Suppose we start with an empty flow. The improvement is a path from the source to the sink The proof will rely on the following three lemmas: Lemma Maximum st-flow (maxflow) problem: Assign flows to edges that Maintain local equilibrium: inflow = outflow at every vertex (except s and t). of graph problems. Then we check whether an improvement is possible. Maximize total flow into t Maximum Flow Problem In a directed graph with source vertex s, sink vertex t, and non -negative arc capaicities, find a maximum flow from sto t In this lecture we continue our discussion of the maximum ow problem. The idea of the method is "iterative improvement". Kurt Mehlhorn. The maximum flow value is the minimum value of a cut. nput: a a directed graph G = (V; E), source node sV, sink node tVedge capacities cap: E! IR ¸Goal: s 1//// Network Flow Problem.