Flows in Networks: Introduction

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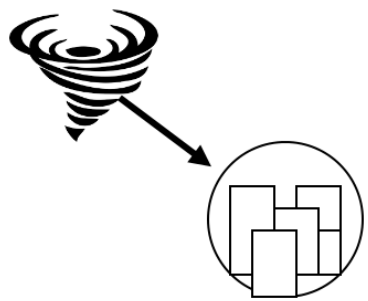
Advanced Algorithms and Complexity
Data Structures and Algorithms

Learning Objectives

- Understand an example of the type of problem we will be working on in this unit.

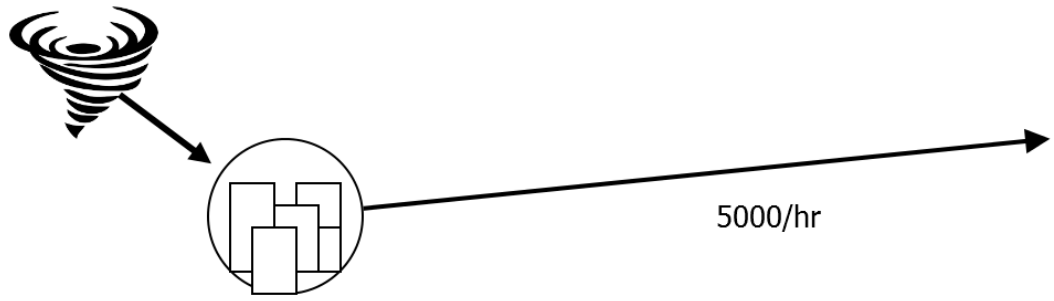
Disaster Relief

How fast the city could be evacuated in an emergency?



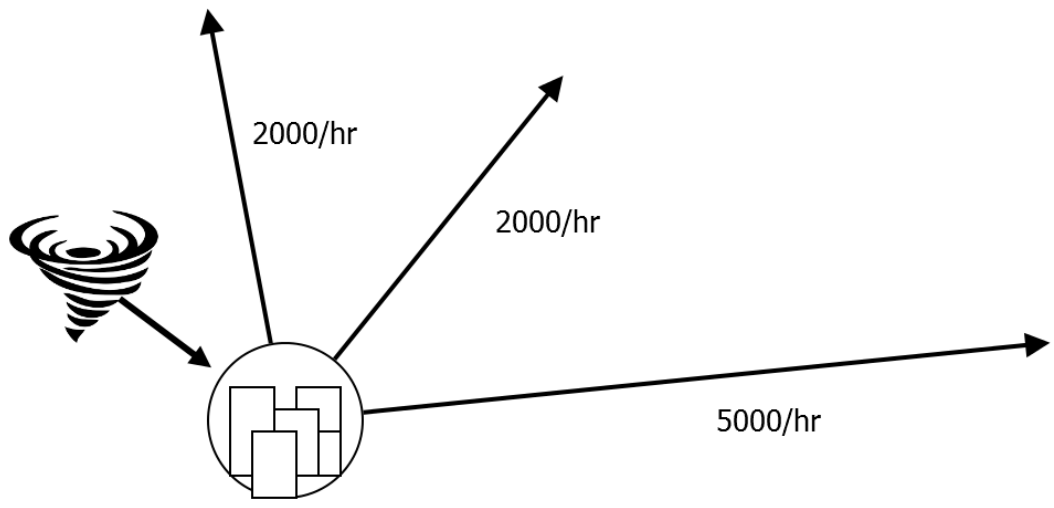
Roads

The main highway can handle 5000 cars an hour.



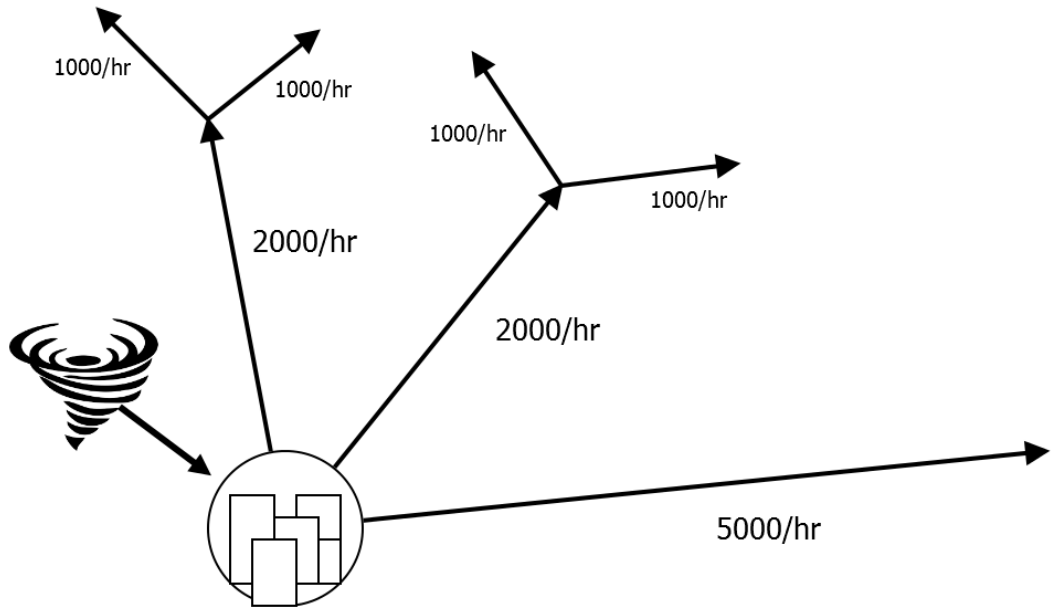
Roads

Two secondary roads can each handle 2000 an hour.



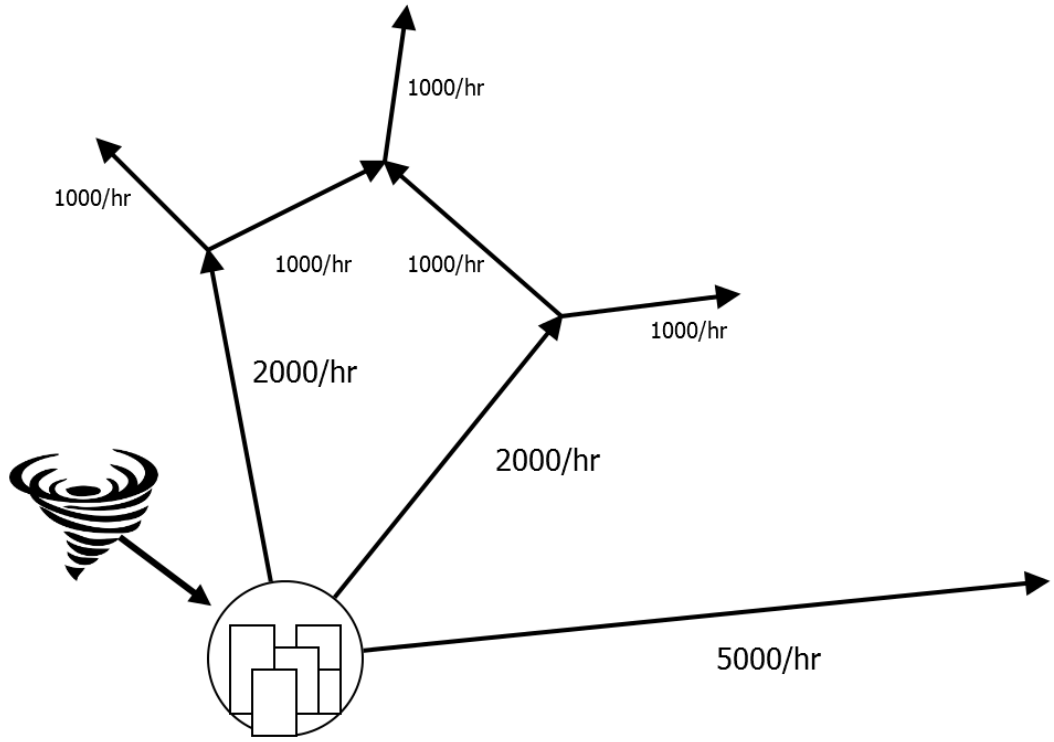
Roads

But each of them splits later on into two halves.



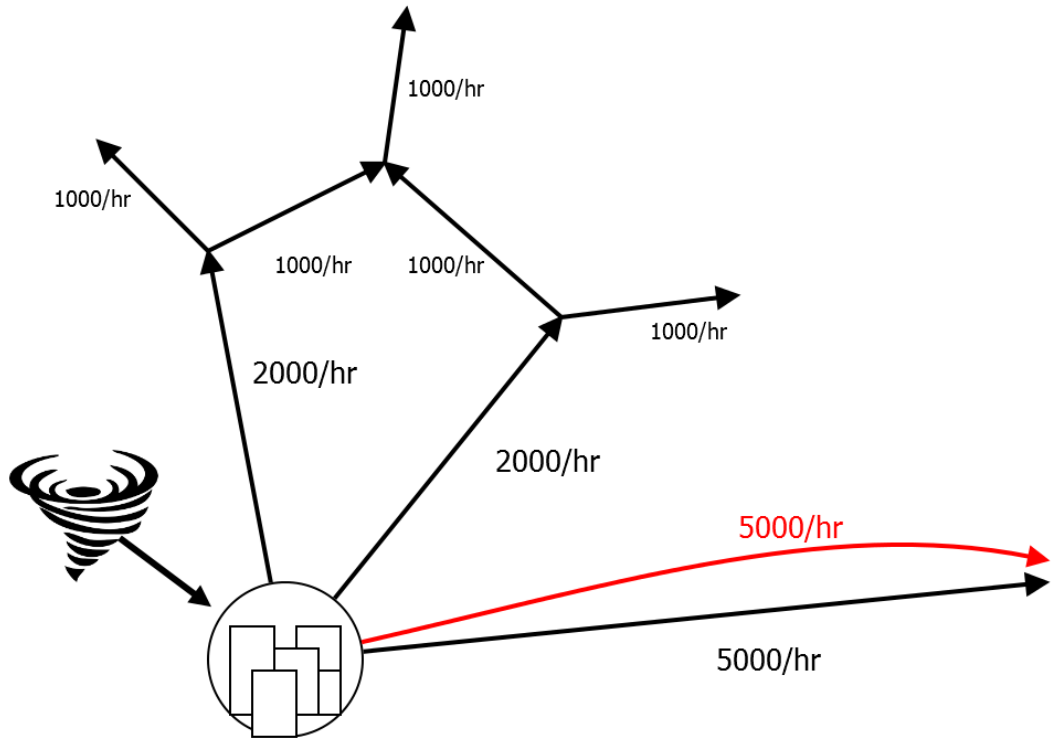
Roads

And two of the halves merge together. Can still only take 1000/hour.



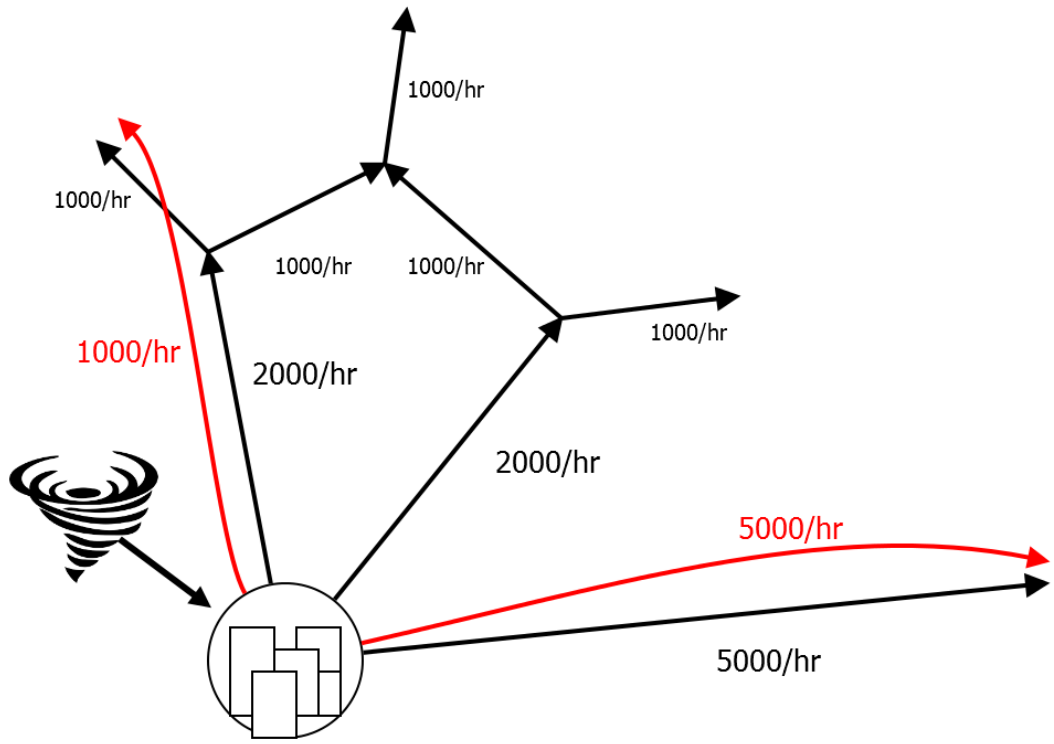
Evacuation Routes

5000 on the main road.



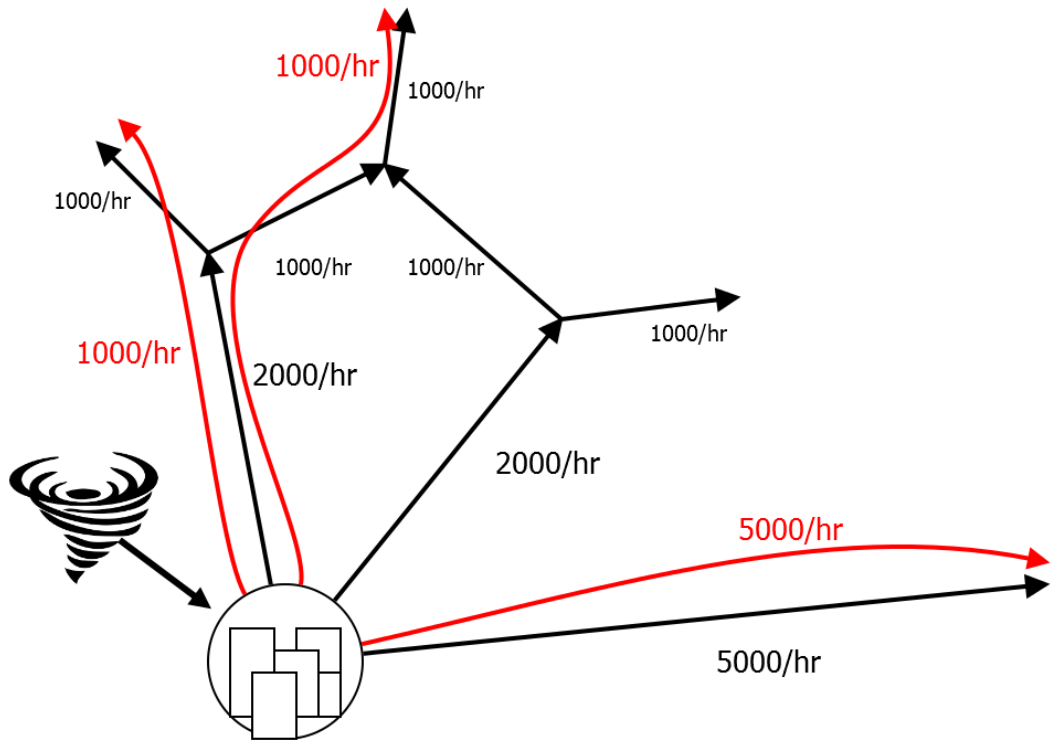
Evacuation Routes

1000 on the northern path.



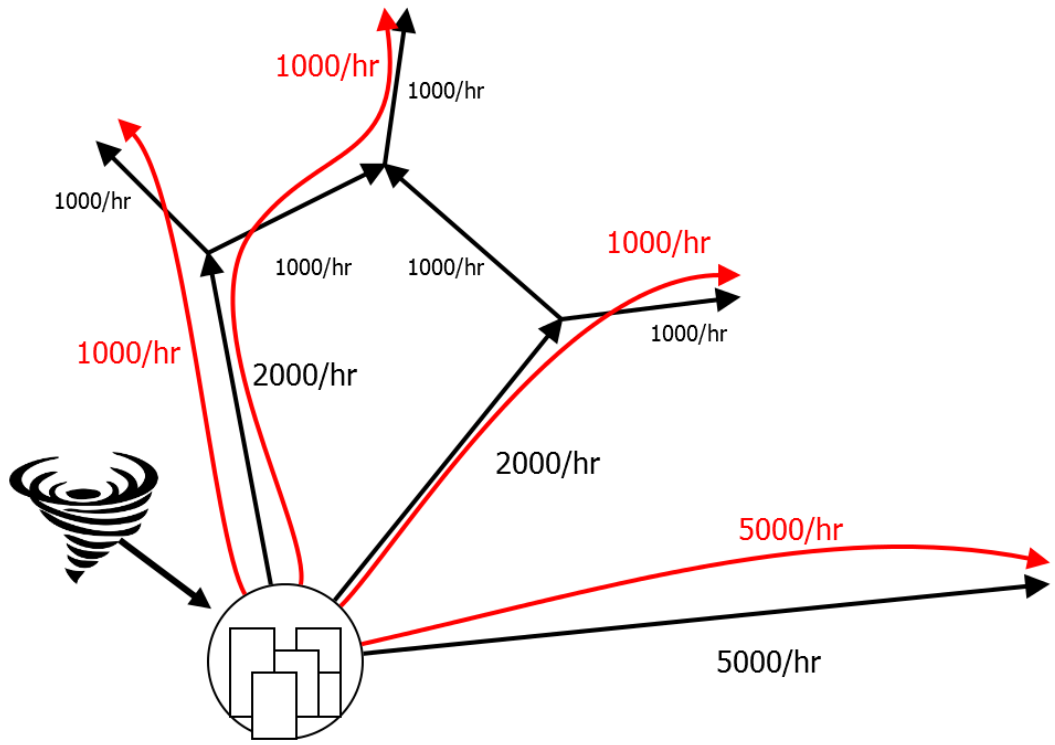
Evacuation Routes

1000 more on the merged road.



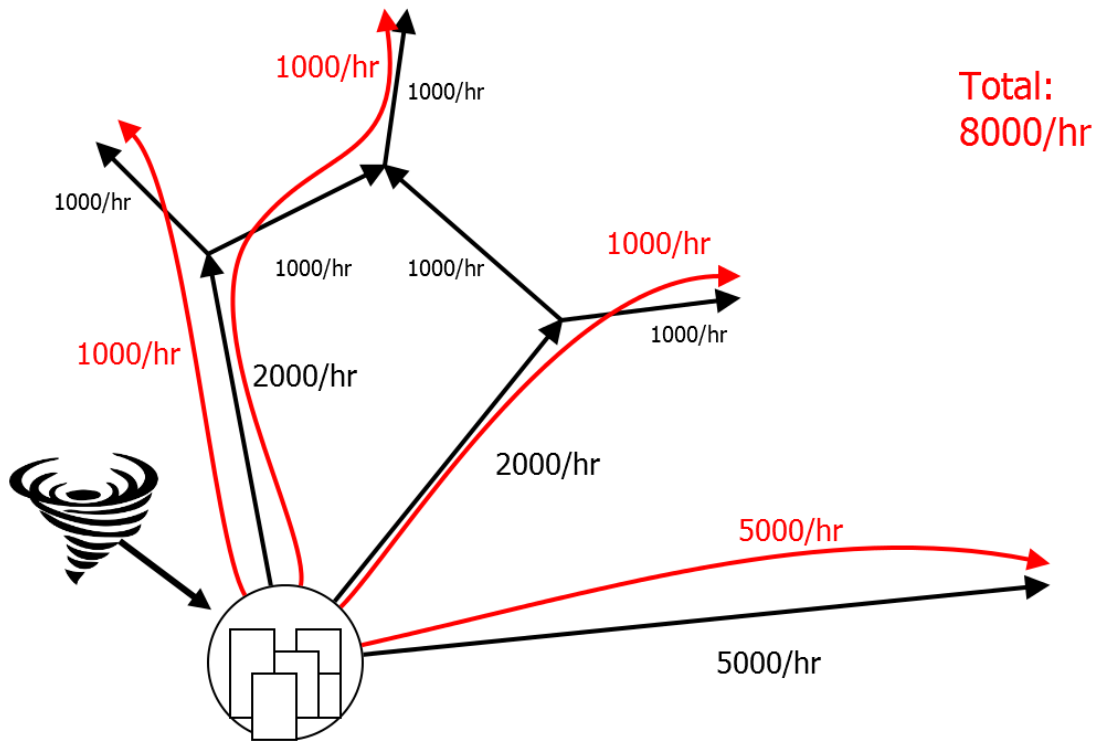
Evacuation Routes

1000 more on the third highway.



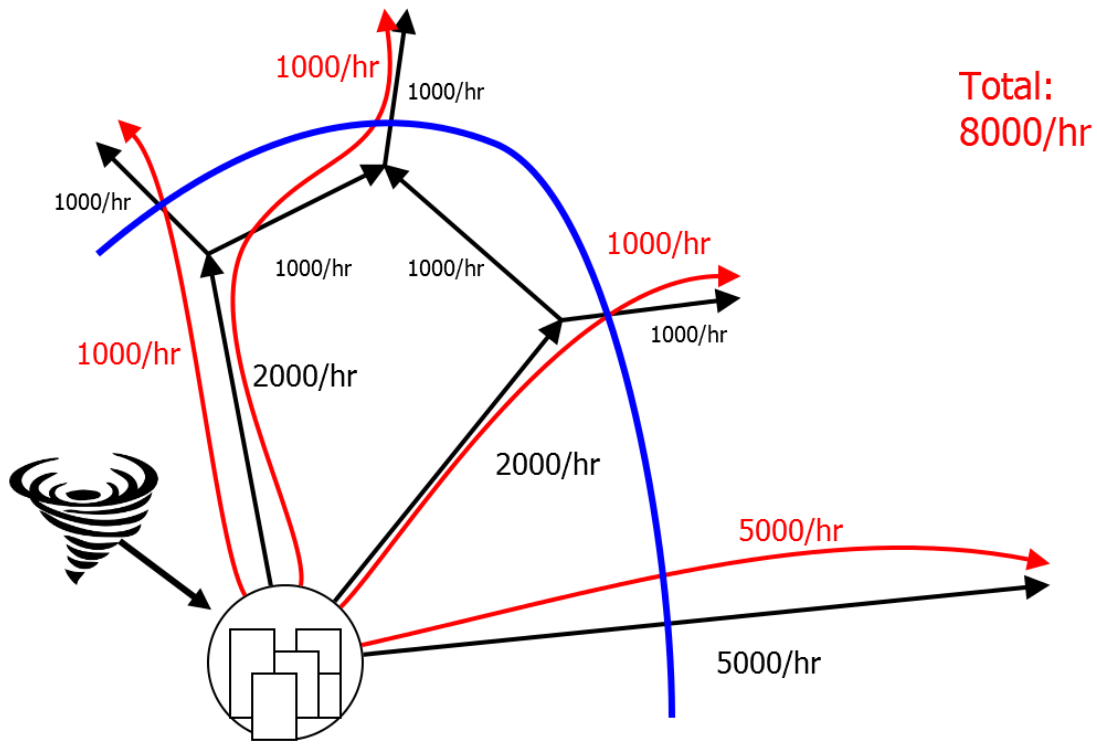
Total

8000 cars/ hour. Can you do better?



River

No! Only 8000/hour can cross the river.



Network Flow

Network flow problems allow you to study problems like this one.

Next Time

- Formal definition of a flow problem.
- Examples of where these problems show up.