
Electric transmission and electric transmission property rights: Issues and difficulties.

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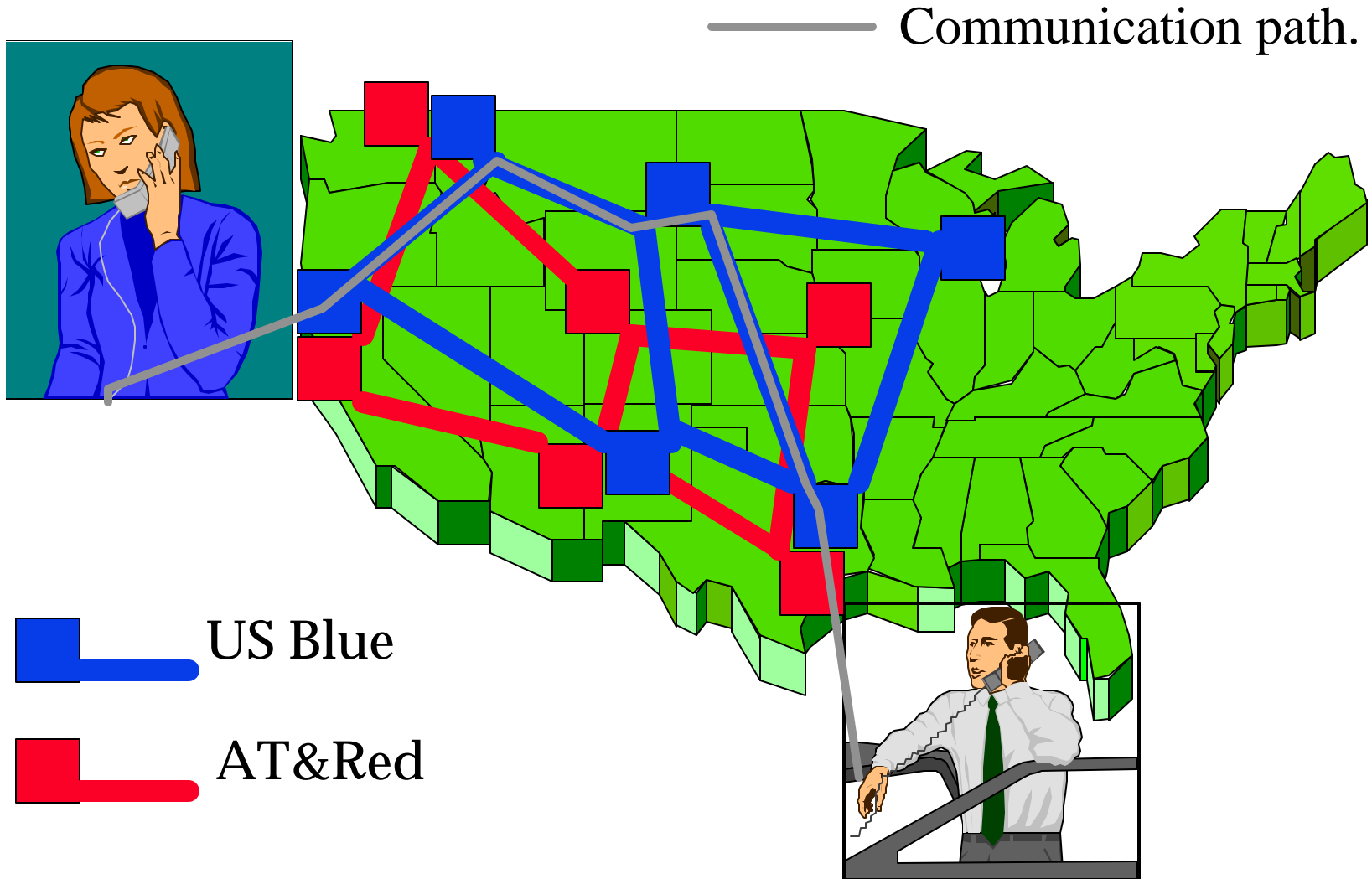
Background.

- Restructured generation markets have resulted in a huge increase in generation,
- Transmission remains regulated,
- New transmission expansion has been small in comparison:
 - May or may not be a bad thing!
 - Electric transmission is much more of an imposition on neighbors than fiber!




Outline

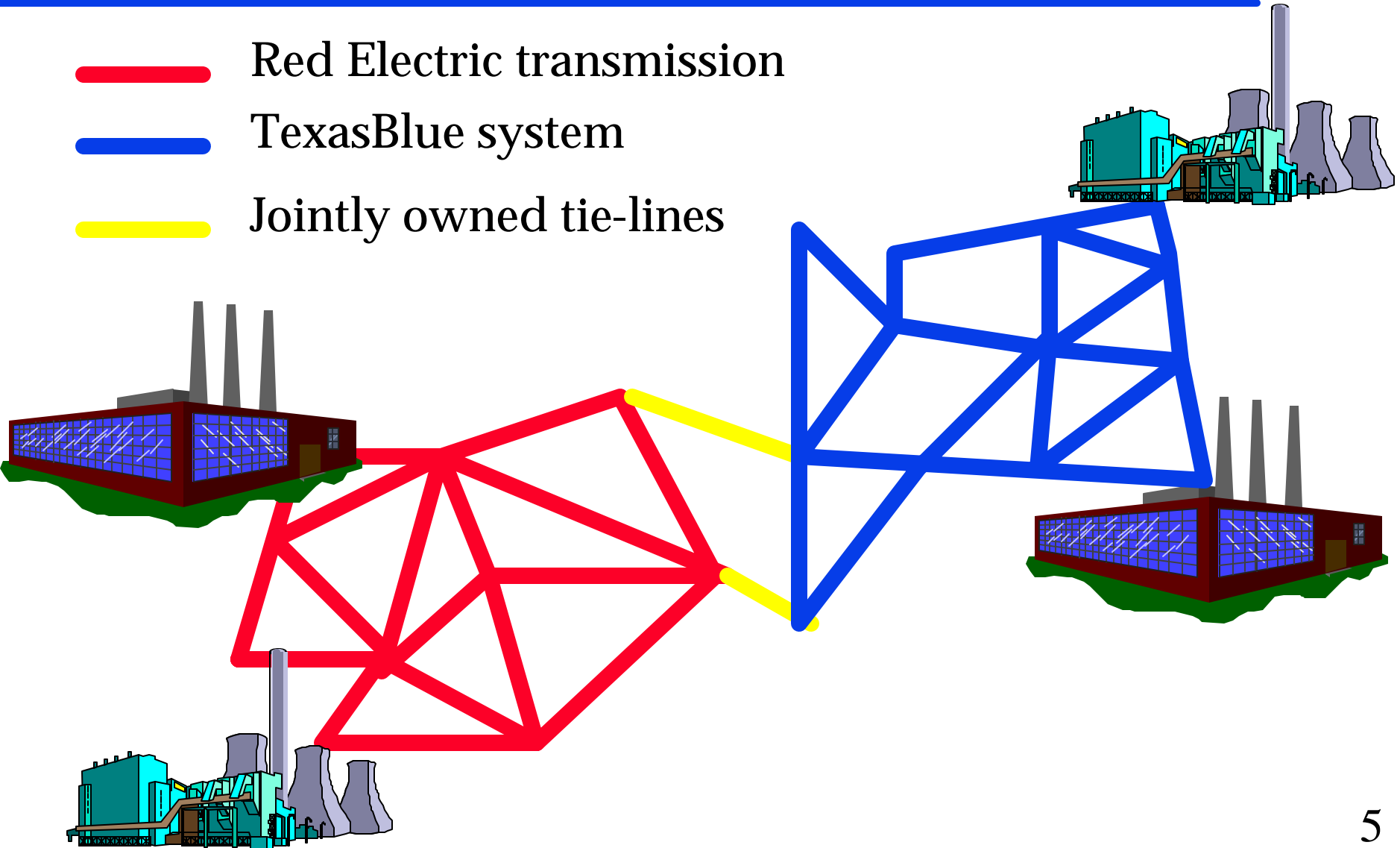
- Ownership of communications versus transmission,
- Routing,
- Security constraints,
- Opposite flows cancel,
- Property rights implications.

Circuit-switched voice communication.

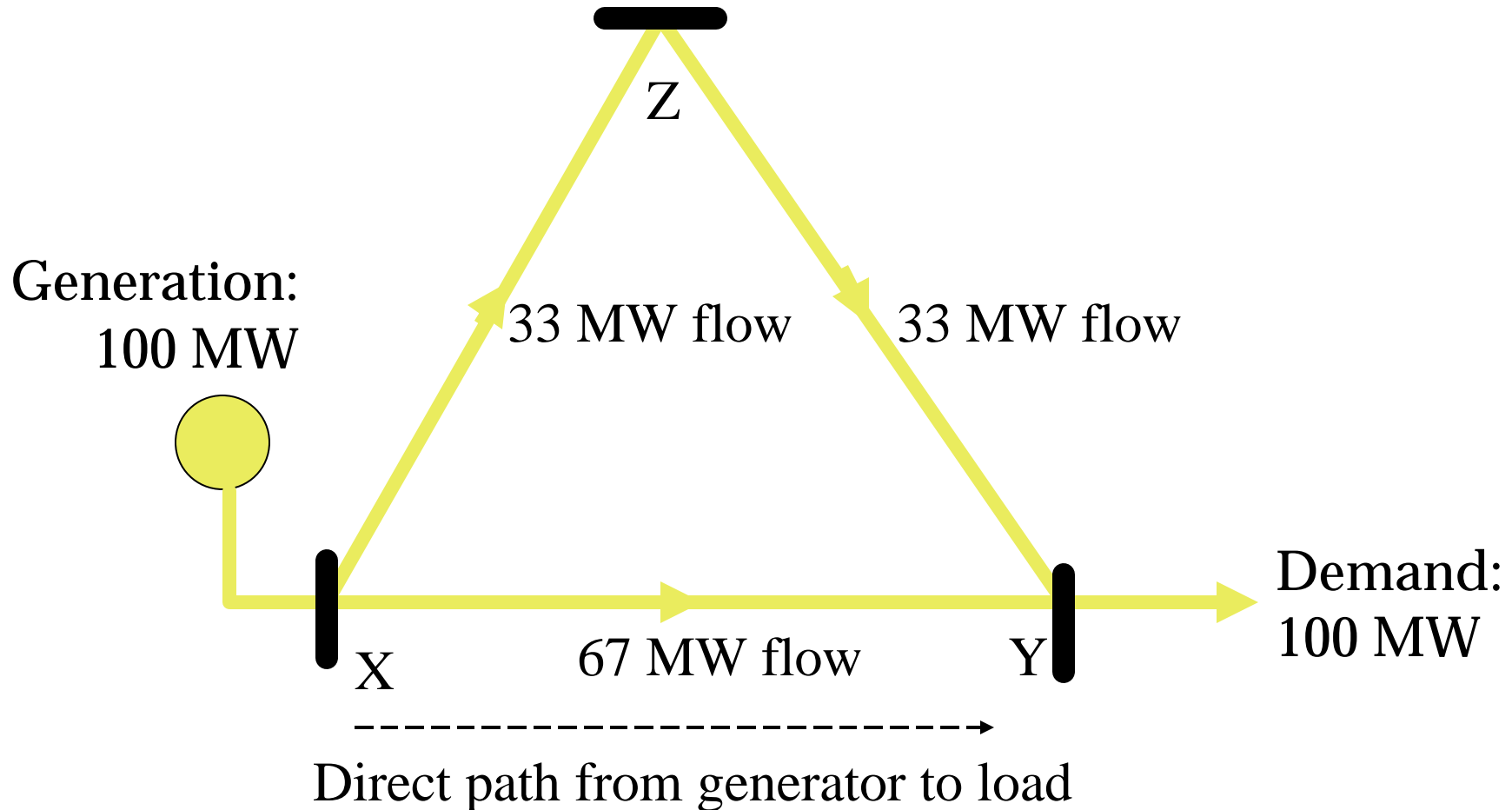


Electric transmission ownership.

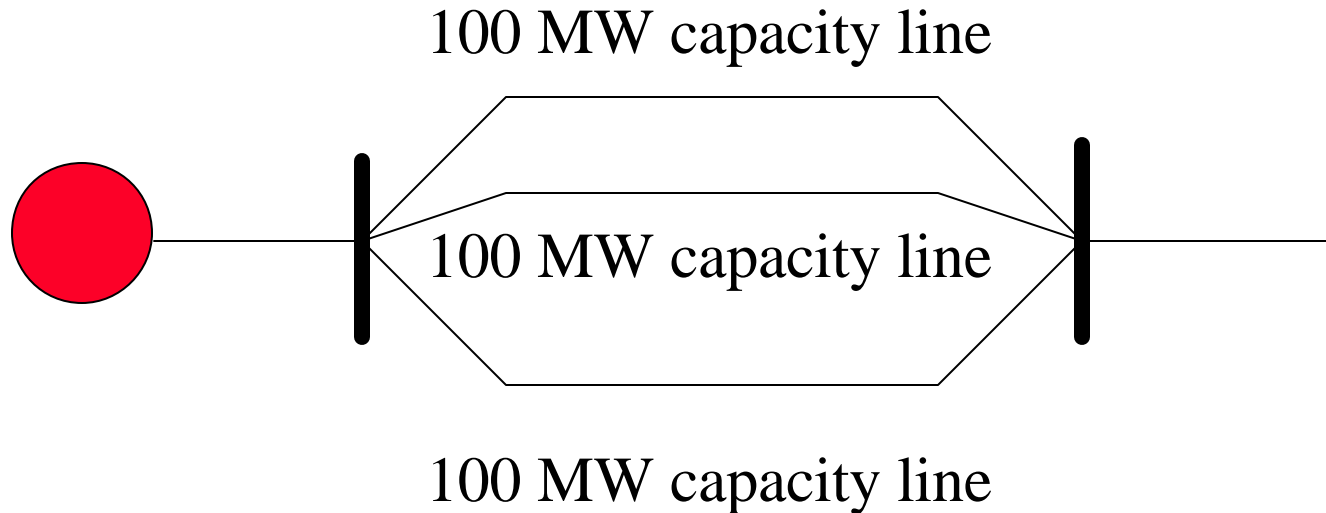
-  Red Electric transmission
-  TexasBlue system
-  Jointly owned tie-lines



Implications of Kirchhoff's laws: no routing.

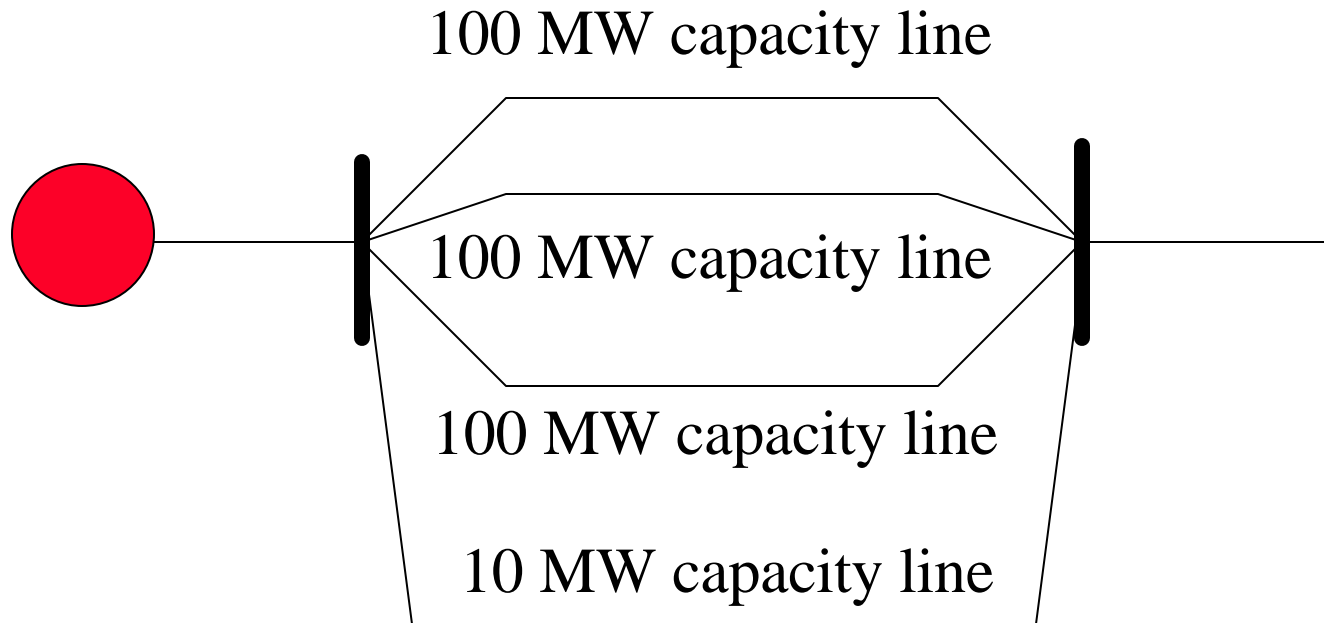


Secure transmission operation.



- Must operate to withstand any single outage,
- Three lines on a single corridor, each with same “impedance” and nominal capacity of 100 MW, can only transmit 200 MW securely.

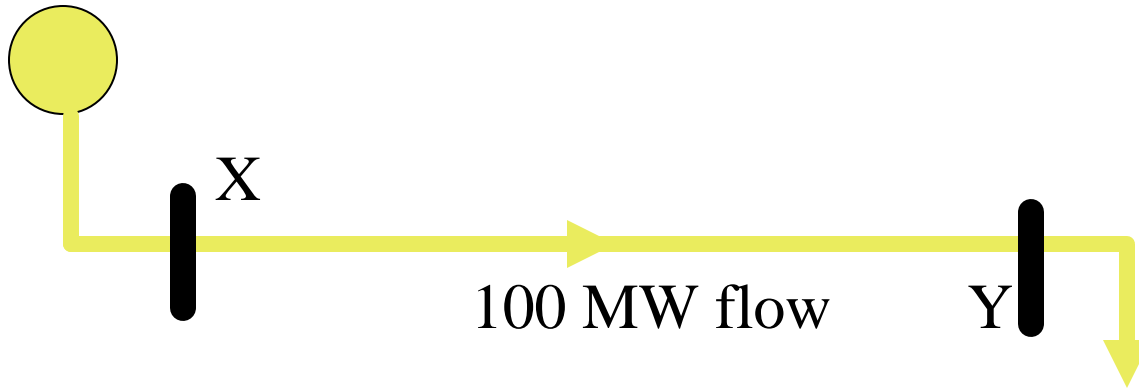
Addition of line can reduce capacity.



- Add line with same impedance but lower capacity,
- Must operate to withstand any single outage,
- Worst outage is loss of 100 MW line
- Now can only transmit 30 MW securely.

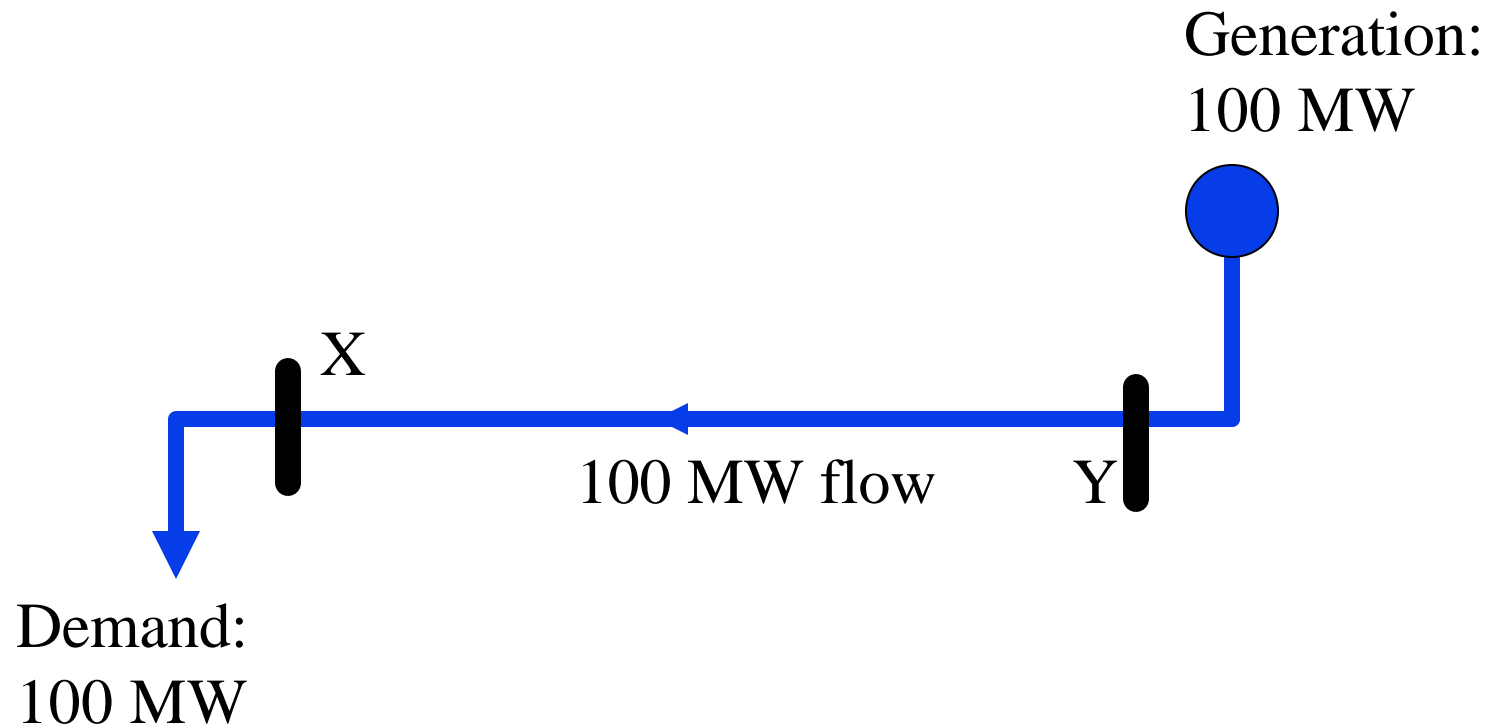
100 MW flow from X to Y.

Generation:
100 MW



Demand:
100 MW

100 MW flow from Y to X.



Opposite flows: net flow is zero.

Generation:
100 MW



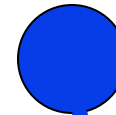
Demand:
100 MW

X

0 MW flow

Y

Generation:
100 MW



Demand:
100 MW

Property rights implications.

- How do I define the product of transmission?
 - Produces ability to transmit power,
- Ability to transmit power securely depends on sharing of flows:
 - A single line by itself has zero capacity!
- But sharing of flows makes it difficult to define the service that a single line offers to the rest of the system!

Property rights implications.

- Compare to property right for a generator:
 - Energy it produces,
 - Can be sold at prevailing price.
- Compare to property right for a communication line:
 - Bits it transmits.

Property rights implications.

- Further complications in defining transmission property rights due to historical “unphysical” definition of property rights!
 - Grandfathering of historical rights mechanisms,
- Further complications still due to substitutability of local generation and transmission plus remote generation:
 - Coexistence of regulated and unregulated industry sectors is problematic!