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.

Communication path.

US Blue

AT&T Red
Electric transmission ownership.

- Red Electric transmission
- TexasBlue system
- Jointly owned tie-lines
Implications of Kirchhoff’s laws: no routing.

Generation: 100 MW

Demand: 100 MW

Direct path from generator to load

33 MW flow

67 MW flow

33 MW flow
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.

Demand: 100 MW

Generation: 100 MW
Opposite flows: net flow is zero.

Generation: 100 MW

Demand: 100 MW

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!