Project History

REGION 14

C86

Current

Scenario 3

Scenario 2

Base

10X10

Scenario 1

IN

Brady - CCTR - 12/08
Discrete Event Simulation

- The imitation of a dynamic system using a computer model in order to evaluate and improve system performance
- The modeling of a system in such a way that the model mimics the response of the actual system to events that take place over time
Discrete Event Simulation

- Fundamental laws are not available
  - Capacity is hard to estimate
- Many procedural elements are involved which are difficult to describe and represent
  - Trackage rights, signaling systems
- Policy inputs are necessary which may be hard to describe
  - Right of Ways
- Random components are significant
  - Speed, congestion, weather, delays, maintenance, equipment failures
- Human decision making is an integral part of the system
  - Train Control
Rail Modeling Platform

- Link
  - Distance
  - Max Speed

- Station
  - Station Delay
  - Mechanical Delay
  - Congestion Factor

- Function definitions:
  - $f(\text{random factor, weather})$
  - $f(\text{crew change})$
  - $f(\text{gross ton miles/mile/year})$
Prosperity Coal to Schahfer

Scenario 6: Prosperity to Schahfer via West link with North link

Scenario 5: Prosperity to Schahfer via West link
Prosperity Coal to Schahfer

Scenario 4: Prosperity to Schahfer with hypothetical North and South links

Scenario 11: Eastern Illinois through Chicago
Some Results

Cycle Time Variability

Hours

As-Is  North  South  N & S  West  W & N  Northwest IL - Chicago
Port Rationale

- Coal exports up 26% in 2008
- Michigan & Wisconsin import 98%+ coal requirements
  - MI imported 38.5 million tons worth 1.36 billion in 2007, 82% from PRB
  - “A large portion of that coal is transported by rail to the western end of Lake Superior, where it is loaded into freighter ships for delivery to power plants largely located along Great Lakes shorelines”
- Indiana has an international port on Great Lakes
West Scenario
East Scenario
Results

**Velocity**

- West
- East
- Central

**Cycle Time**

- West
- East
- Central

**Velocity**

- BNSF
- CP
- CSX
- KCS
- NS
- UP
Further Work

• Analyze other routes
• Utilize multiple unit trains
• Utilize multiple mines
• Suggestions?