

## Coal Line Maintenance

Sets     $N$  nodes  
            $A$  arcs  
            $T$  weeks

Data     $cap_a$  capacity for arc  $a \in A$

$f_a, t_a$  from and to nodes for arc  $a \in A$   
 $\delta_a$  1 if arc  $a \in A$  has a maintenance, 0 otherwise.  
 $d_a$  man days for maintaining arc  $a \in A$   
 $days_t$  max man days in week  $t \in T$

Variables     $x_{at}$  amount flowing on arc  $a \in A$  in week  $t \in T$

$y_{at}$  1 if maintain arc  $a \in A$  in week  $t \in T$   
           0 if not.

Objective    max  $x_{Load1} + x_{Load2} + \sum_{t \in T} x_{Back,t}$

Constraints     $x_{at} \leq cap_a (1 - y_{at}) \quad \forall a \in A, t \in T$

$$\sum_{\substack{a \in A \\ st \ t_a = n}} x_{at} = \sum_{\substack{a \in A \\ st \ f_a = n}} x_{at} \quad \forall n \in N, t \in T$$

$$\sum_{a \in A} y_{at} d_a \leq days_t \quad \forall t \in T$$

$$x_{at} \geq 0 \quad \forall a \in A, t \in T$$

$$y_{at} \in \{0, 1\} \quad \forall a \in A, t \in T$$

$$\sum_{t \in T} y_{at} = \delta_a \quad \forall a \in A$$