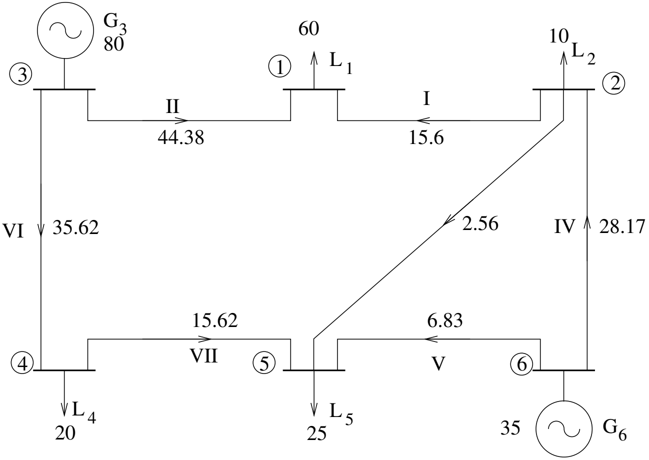
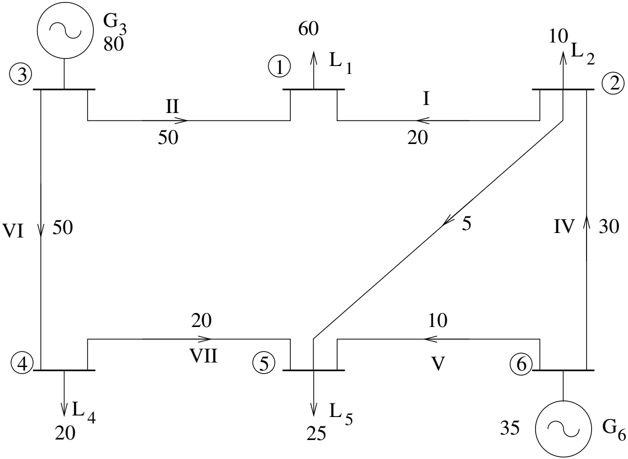
Load flow

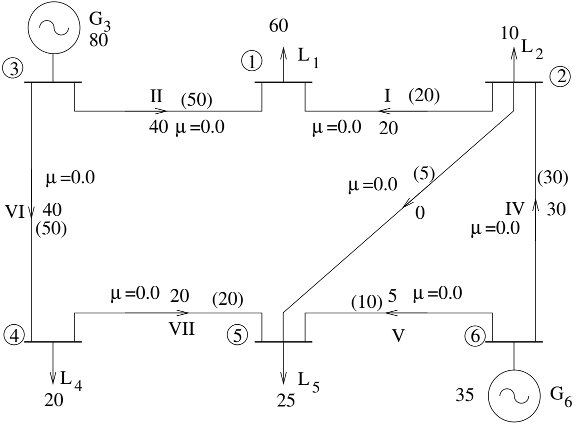


G3
80
3
60
1
L1
10
L2
2
II
44.38
I
15.6
VI
35.62
2.56
IV
28.17
15.62
6.83
4
VII
5
V
6
L4
20
L5
25
35
G6

Branch limits

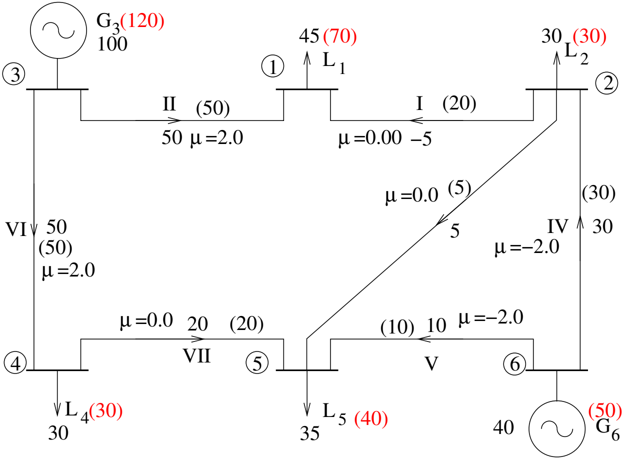


Another Load flow



- Example: 1
  - One exchange alone itself creating congestion
  - Another is small exchange which is not creating any congestion

Exchange 1

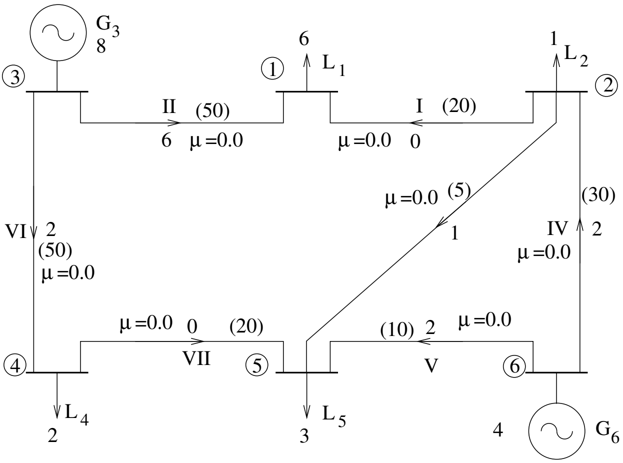


Characteristic function:

$$\nu(PX_1) = G_3 + G_6 + L_1 + L_3 + L_4 + L_5$$

$$\nu(PX_1) = 280\ MW$$

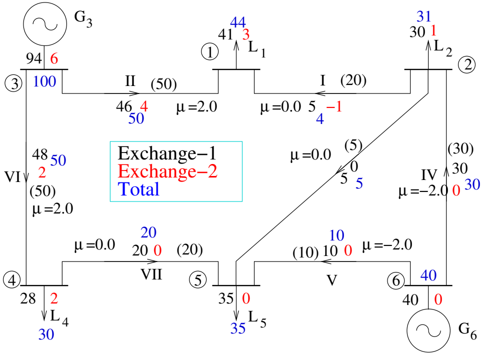
Exchange 2



$$\nu(PX_2) \quad = \quad 24\ MW$$

Both the exchanges at the same time:

Allocation policy: Allocation of trades to achieve min-max fair regret vector



- $Regret(PX_i) = \nu(PX_i) - Payoff(PX_i)$
- Comment: regret is shared equitably
- Not a fair solution

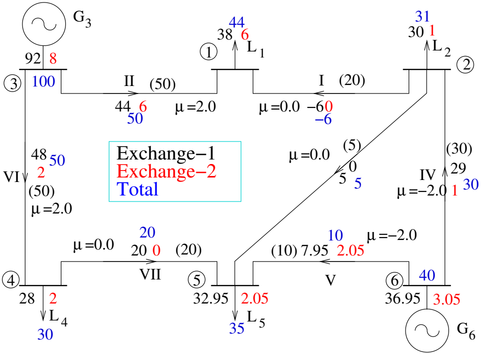
$$\nu(PX_1) = 280 \qquad \nu(PX_2) = 24$$

$$Payoff(PX_1) = 268 \qquad Payoff(PX_2) = 12$$

$$Regret(PX_1) = 12 \qquad Regret(PX_2) = 12$$

Both the exchanges at the same time:

Allocation policy: Allocation of trades to achieve min-max fair proportionate regret vector



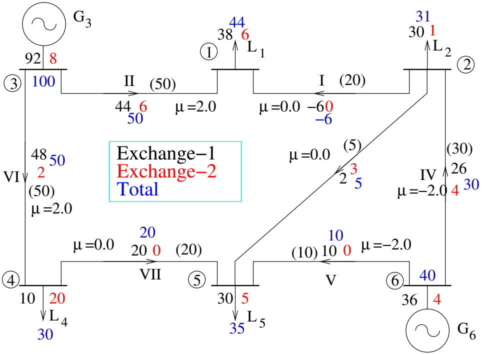
- $\%Regret(PX_i) = \frac{\nu(PX_i) - Payoff(PX_i)}{\nu(PX_i)} \times 100$
- Comment: % regret is shared equitably

$$\nu(PX_1) = 280 \qquad Payoff(PX_1) = 257.895 \qquad \%Regret(PX_1) = 7.895$$

$$\nu(PX_2) = 24 \qquad Payoff(PX_2) = 22.105 \qquad \%Regret(PX_2) = 7.895$$

Both the exchanges at the same time:

Allocation policy: Allocation of trades to achieve max-min fair network allocation

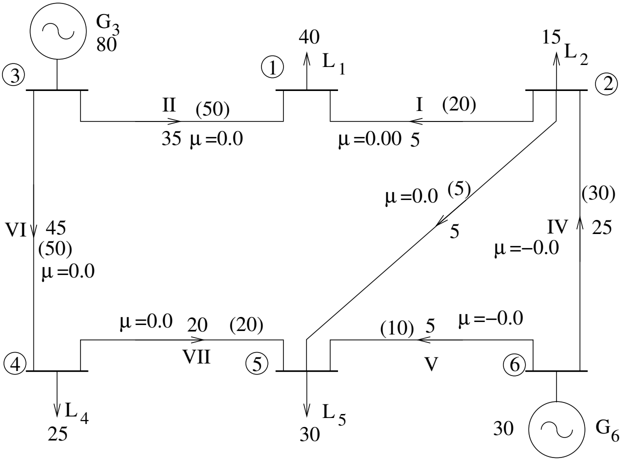


$$\nu(PX_1) = 280 \qquad Payoff(PX_1) = 256 \qquad Regret(PX_1) = 24$$

$$\nu(PX_2) = 24 \qquad Payoff(PX_2) = 24 \qquad Regret(PX_2) = 0$$

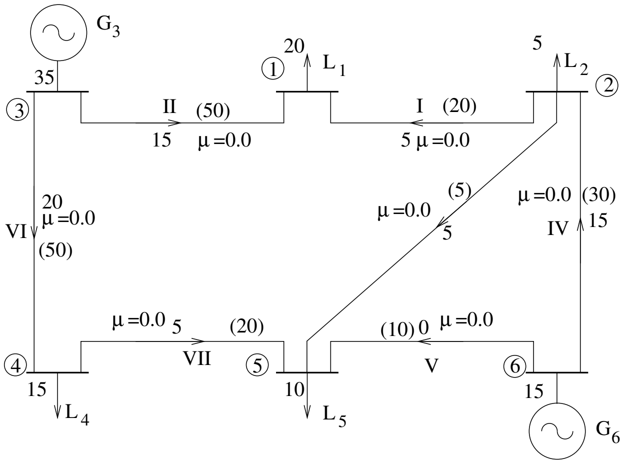
- Example: 2
    - Neither of the exchanges will create congestion alone
    - both the exchanges together will create congestion

Exchange 1



$$\nu(PX_1) = 220$$

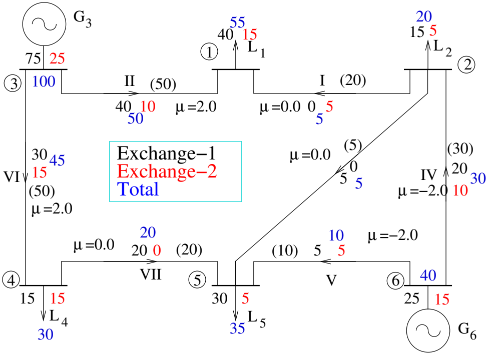
Exchange 2



$$\nu(PX_2) = 100$$

Both the exchanges at the same time:

Allocation policy: Allocation of trades to achieve min-max fair regret vector



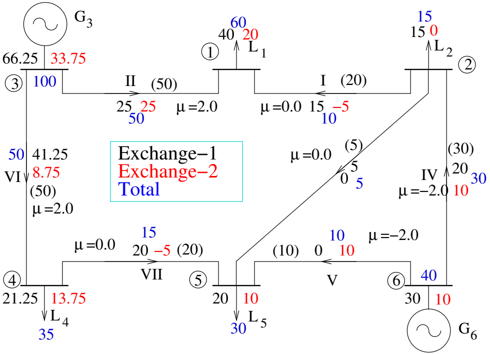
- $Regret(PX_i) = \nu(PX_i) - Payoff(PX_i)$
- Comment: regret is shared equitably
- Not a fair solution

$$\nu(PX_1) = 220 \qquad Payoff(PX_1) = 200 \qquad Regret(PX_1) = 20$$

$$\nu(PX_2) = 100 \qquad Payoff(PX_2) = 80 \qquad Regret(PX_2) = 20$$

Both the exchanges at the same time:

Allocation policy: Allocation of trades to achieve min-max fair proportionate regret vector

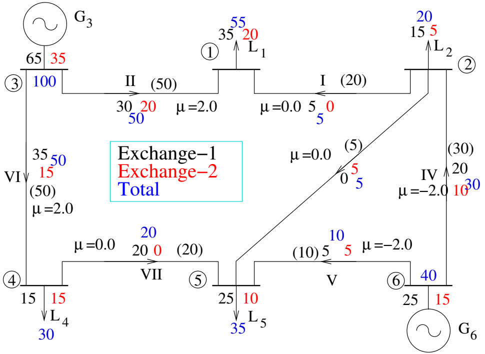


- $\%Regret(PX_i) = \frac{\nu(PX_i) - Payoff(PX_i)}{\nu(PX_i)} \times 100$
- Comment: % regret is shared equitably

$\nu(PX_1) = 220$	$Payoff(PX_1) = 192.5$	$\%Regret(PX_1) = 12.5$
$\nu(PX_2) = 100$	$Payoff(PX_2) = 87.5$	$\%Regret(PX_2) = 12.5$

Both the exchanges at the same time:

Allocation policy: Allocation of trades to achieve max-min fair network allocation



$$\nu(PX_1) = 220$$
$$\nu(PX_2) = 100$$

$$Payoff(PX_1) = 180$$
$$Payoff(PX_2) = 100$$

$$Regret(PX_1) = 40$$
$$Regret(PX_2) = 0$$