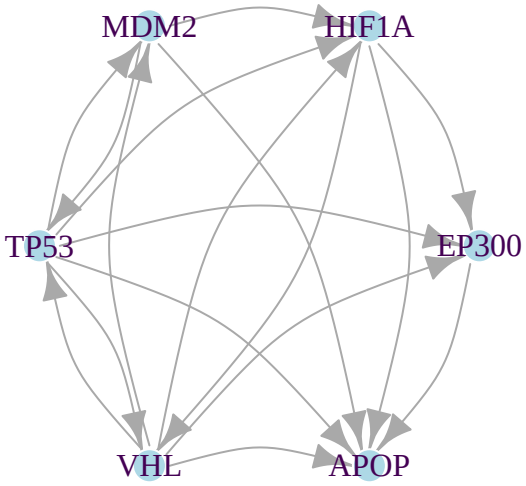
Theoretical Network: BoolNet

Boolean network from HIFaxis

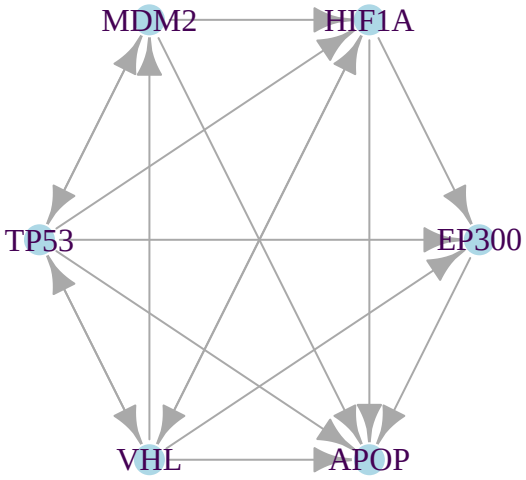
```
net <- loadNetwork("ATOTS.bn")
net
```

```
## Boolean network with 6 genes
##
## Involved genes:
## EP300 HIF1A MDM2 TP53 VHL APOP
##
## Transition functions:
## EP300 = ((TP53 & HIF1A) & !VHL) | (!(TP53 & HIF1A) & VHL)
## HIF1A = !VHL | (!TP53 & MDM2)
## MDM2 = TP53 & !VHL
## TP53 = !MDM2 | VHL
## VHL = HIF1A & !TP53
## APOP = TP53 & EP300 & (!HIF1A | !VHL | !MDM2)
```

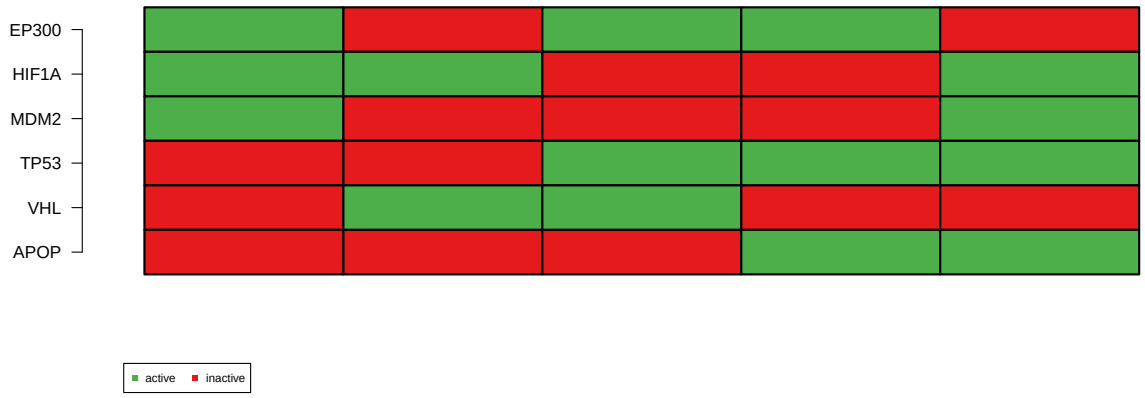
```
HIFaxis.p <- plotNetworkWiring(net, plotIt=F)
plot(HIFaxis.p, vertex.label.color="#440154ff",  vertex.color="lightblue", vertex.frame.color="white",
     main="HIF axis Network\n Theoretical")
```




```
plot(HIFaxis.p, vertex.label.color="#440154ff",  vertex.color="lightblue", vertex.frame.color="white", l
     main="HIF axis Network\n Theoretical")
```



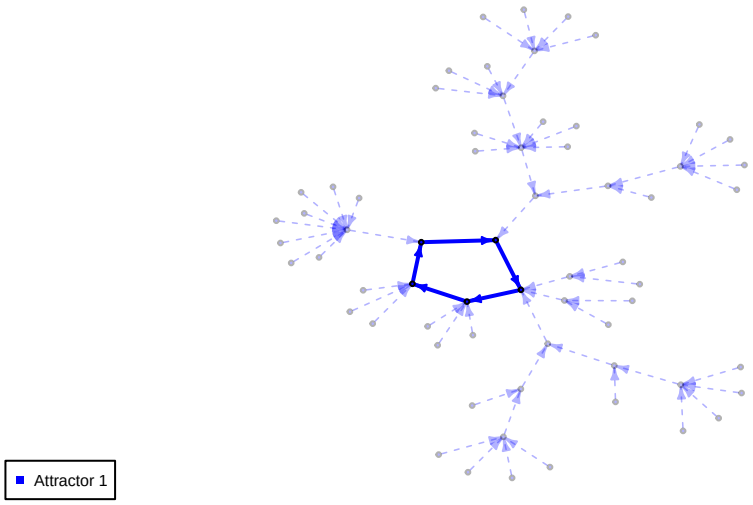

```
attr.syn <- getAttractors(net, type = "synchronous")

# calculate number of different attractor lengths,
# and plot attractors side by side in "table" mode
par(mfrow=c(1, length(table(sapply(attr.syn$attractors,
                           function(attr.syn)
                           {
                             length(attr.syn$involvedStates)
                           })))))

plotAttractors(attr.syn)
```




```
## $`5`
##       Attr1.1 Attr1.2 Attr1.3 Attr1.4 Attr1.5
## EP300       1       0       1       1       0
## HIF1A       1       1       0       0       1
## MDM2        1       0       0       0       1
## TP53        0       0       1       1       1
## VHL         0       1       1       0       0
## APOP        0       0       0       1       1
```

```
# # plot attractors in "graph" mode
# par(mfrow=c(1, length(attr.syn$attractors)))
# plotAttractors(attr.syn, mode="graph")
#
# # identify asynchronous attractors
# attr.asyn <- getAttractors(net, type="asynchronous")
#
# # plot attractors in "graph" mode
# par(mfrow=c(1, length(attr.asyn$attractors)))
# plotAttractors(attr.asyn, mode="graph")
```

```
plotStateGraph(attr.syn)
```




```
sim <- markovSimulation(net,
                        numIterations=1024,
                        returnTable=FALSE)
sim
```

```
## States reached at the end of the simulation:
##   EP300 HIF1A MDM2 TP53 VHL APOP Probability
## 1     1     1    1    0   0    0      0.1875
## 2     0     1    0    0   1    0      0.4375
## 3     1     0    0    1   1    0      0.1250
## 4     1     0    0    1   0    1      0.1250
## 5     0     1    1    1   0    1      0.1250
```