2005-5: IPv6 HD Ratio

- Policy Proposal changes the HD ratio for IPv6 allocations from current ratio of 0.8 to 0.94

- Reason for changing policy
  - Some research projections have shown that we could run through between a /1 & /4 of IPv6 address space over a 60 year period using the current IPv6 policy
  - Some have raised concerns about the large IPv6 allocations to current IPv4 address users
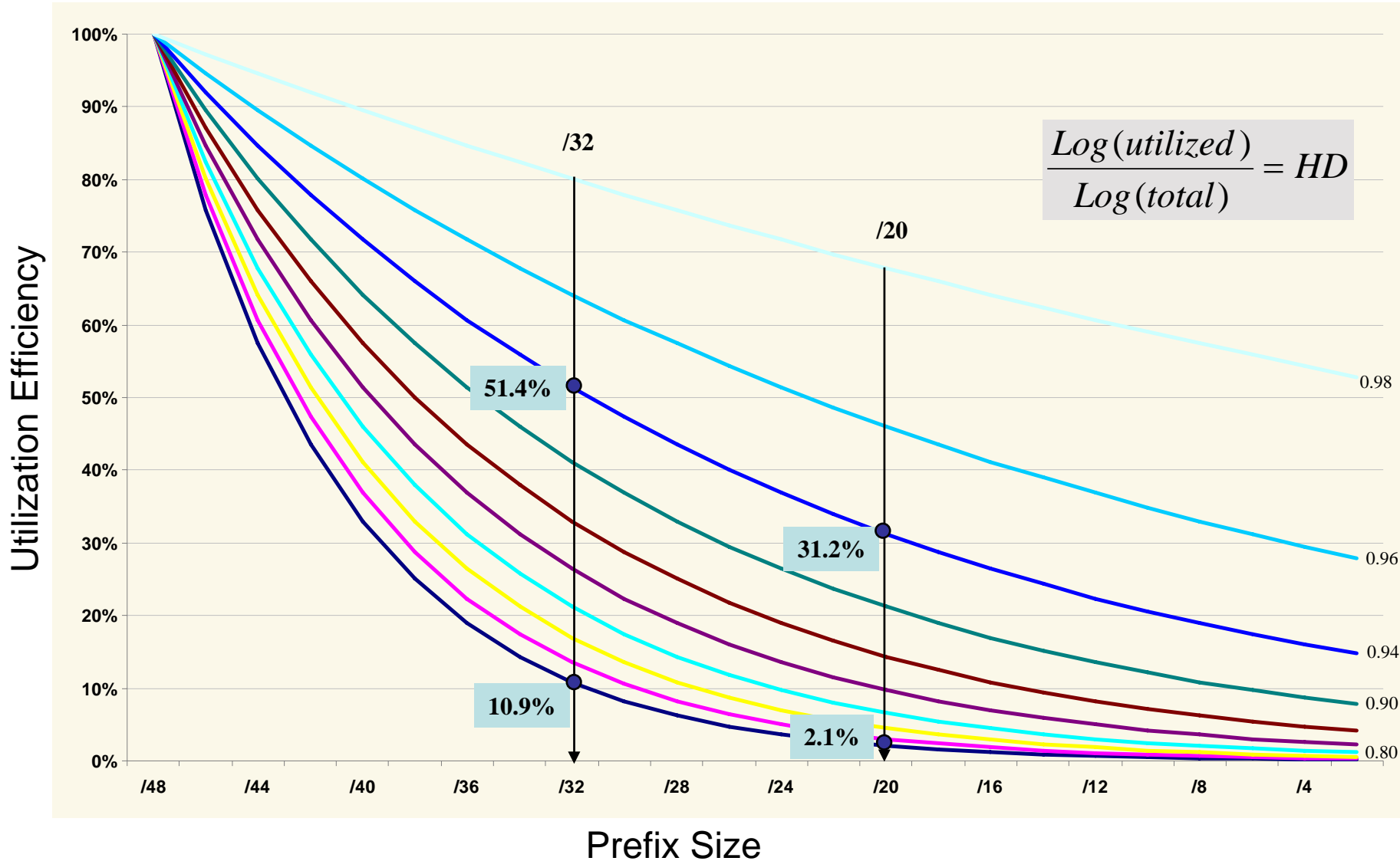
Pro & Con

- Pro
  - Based on some projections lengthens the lifecycle of IPv6
  - Straight forward change that can be easily changed in the future as needed
  - Reduces the "capture" of huge IPv6 blocks based upon IPv4 assignments
  - APNIC & RIPE are currently considering a change to the same HD ratio
- Con
  - Requires LIRs to be more "efficient" with the address space you have been allocated

Sample Ratio Change

- Under current HD ratio policy a LIR with a /32 can justify an additional prefix when they have assigned 7,132 of 65,536 /48s

- Under this policy a LIR with a /32 would have to assign 32,317 of 65,356 /48s before receiving an additional allocation

Varying the HD Ratio

$$\frac{Log(utilized)}{Log(total)} = HD$$

/32

/20

Utilization Efficiency

51.4%

31.2%

10.9%

2.1%

0.98

0.96

0.94

0.90

0.80

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%

/48   /44   /40   /36   /32   /28   /24   /20   /16   /12   /8   /4

Prefix Size

Changes in Allocations

- **80% of all allocations are /31, /32 for HD ratio of 0.8 or higher**
  - Changing the HD ratio will not impact these allocations and the LIRs

- **2% of all allocations are larger than a /27**
  - Subnet Utilization is changed from ~4% to ~25%

- **Changing the HD ratio will recover about 3 bits of the total allocations**

Data by: Geoff Huston

Comparison of prefix size distributions from V6 registry simulations

Comparison of Prefix Distributions

Graph by: Geoff Huston