IPv6 Address Space Management
Report of IPv6 Registry Simulation

Policy SIG
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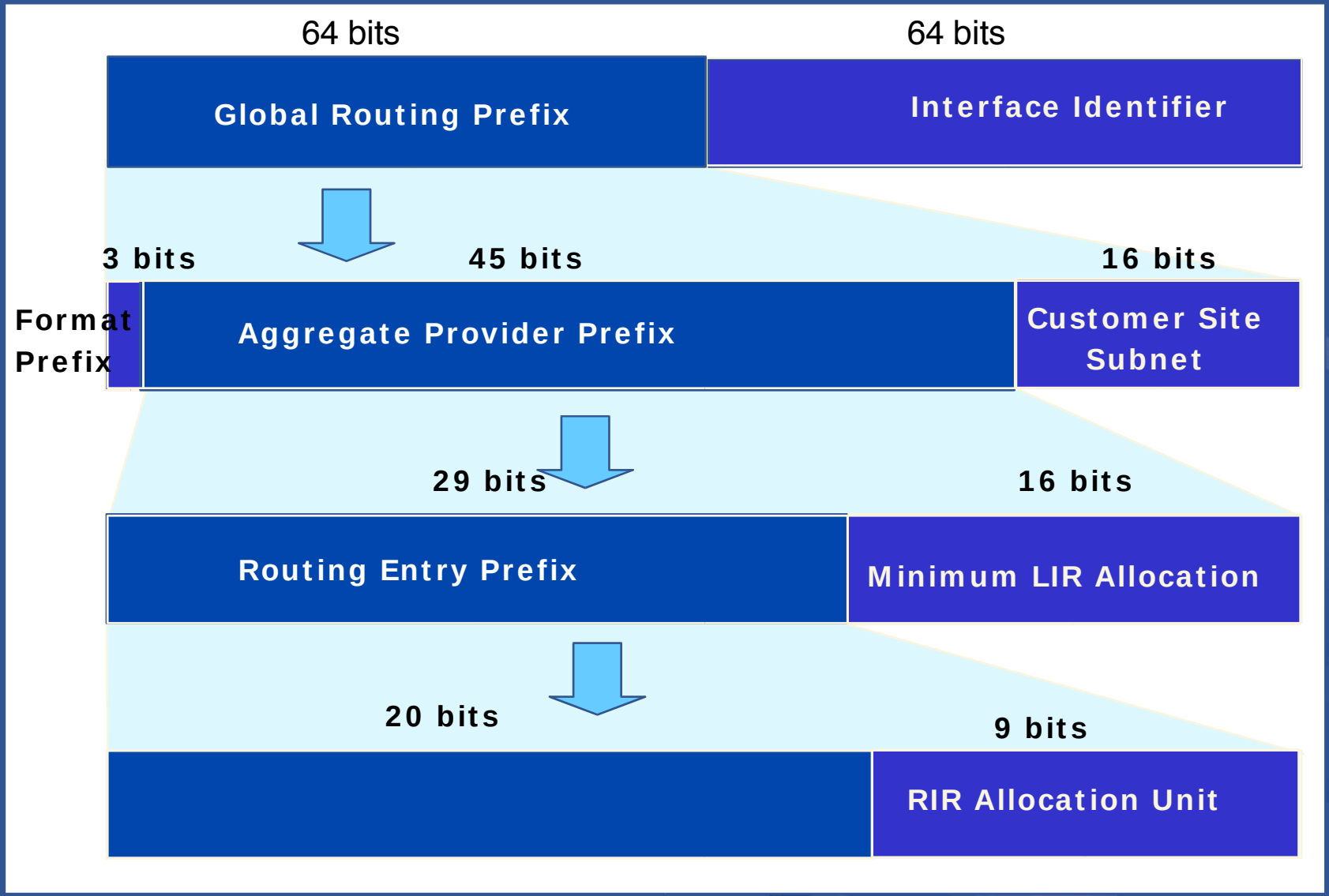
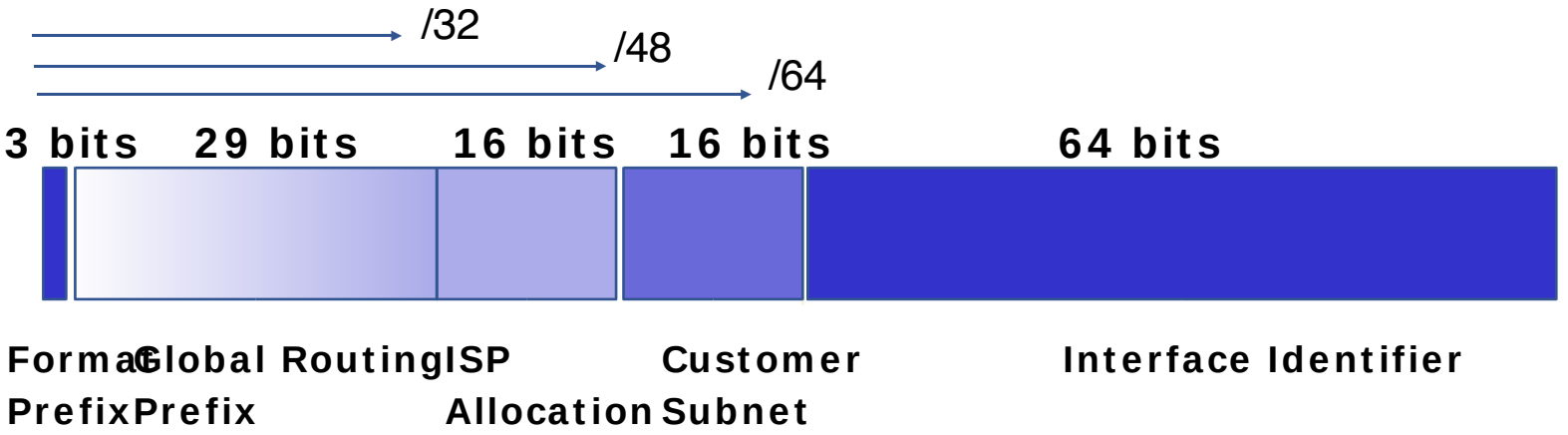
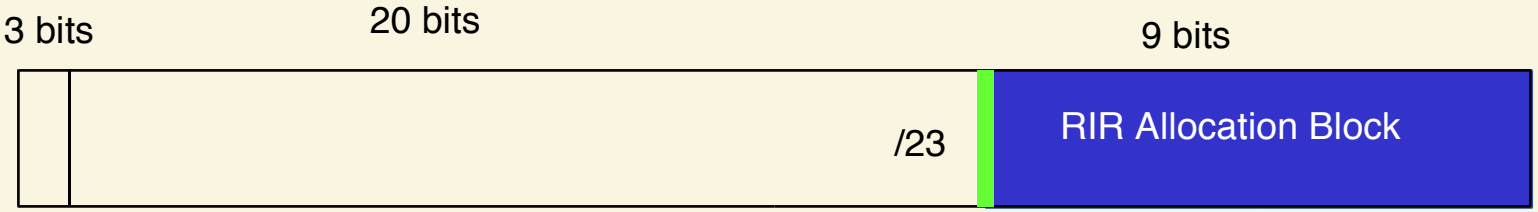
IPv6 Address structure



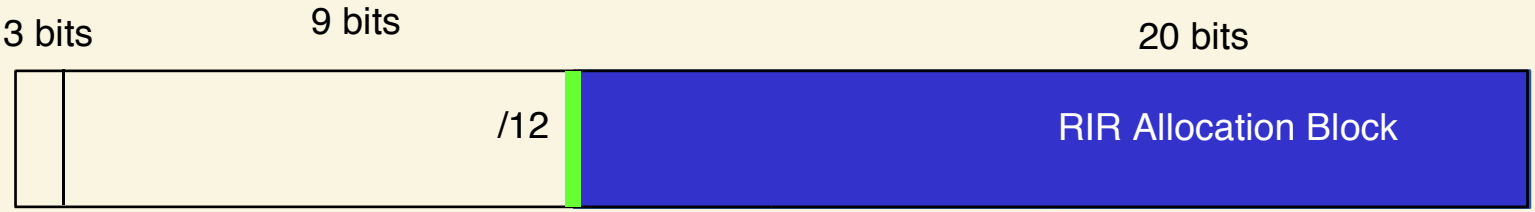
IPv6 Address structure



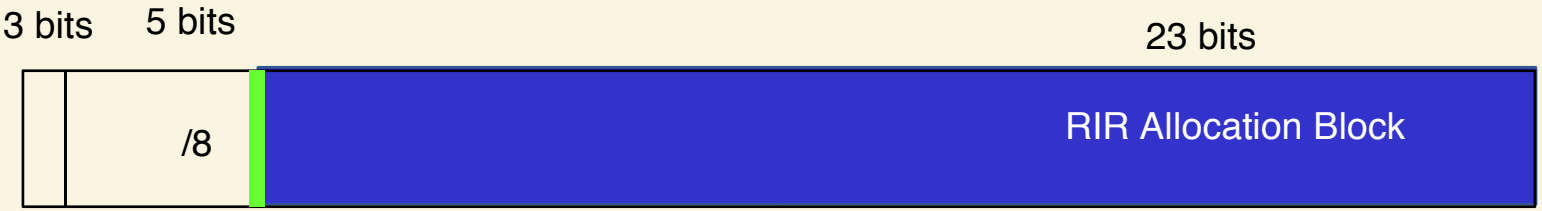
IANA to RIR Allocation size



/23 Allocation: Each allocation supports up to 512 /32 allocations



/12 Allocation: Each allocation supports up to 1M /32 allocations



/8 Allocation: Each allocation supports up to 17M /32 allocations

IANA to RIR Allocation size parameters

- Ensuring address aggregation outcomes within the parameters of:
  - Profile of IPv6 LIR / ISP requests
  - Chosen Host Density metric
  - Allocation address block lifetime
  - Reverse space management
  - Adopted RIR address pool management technique

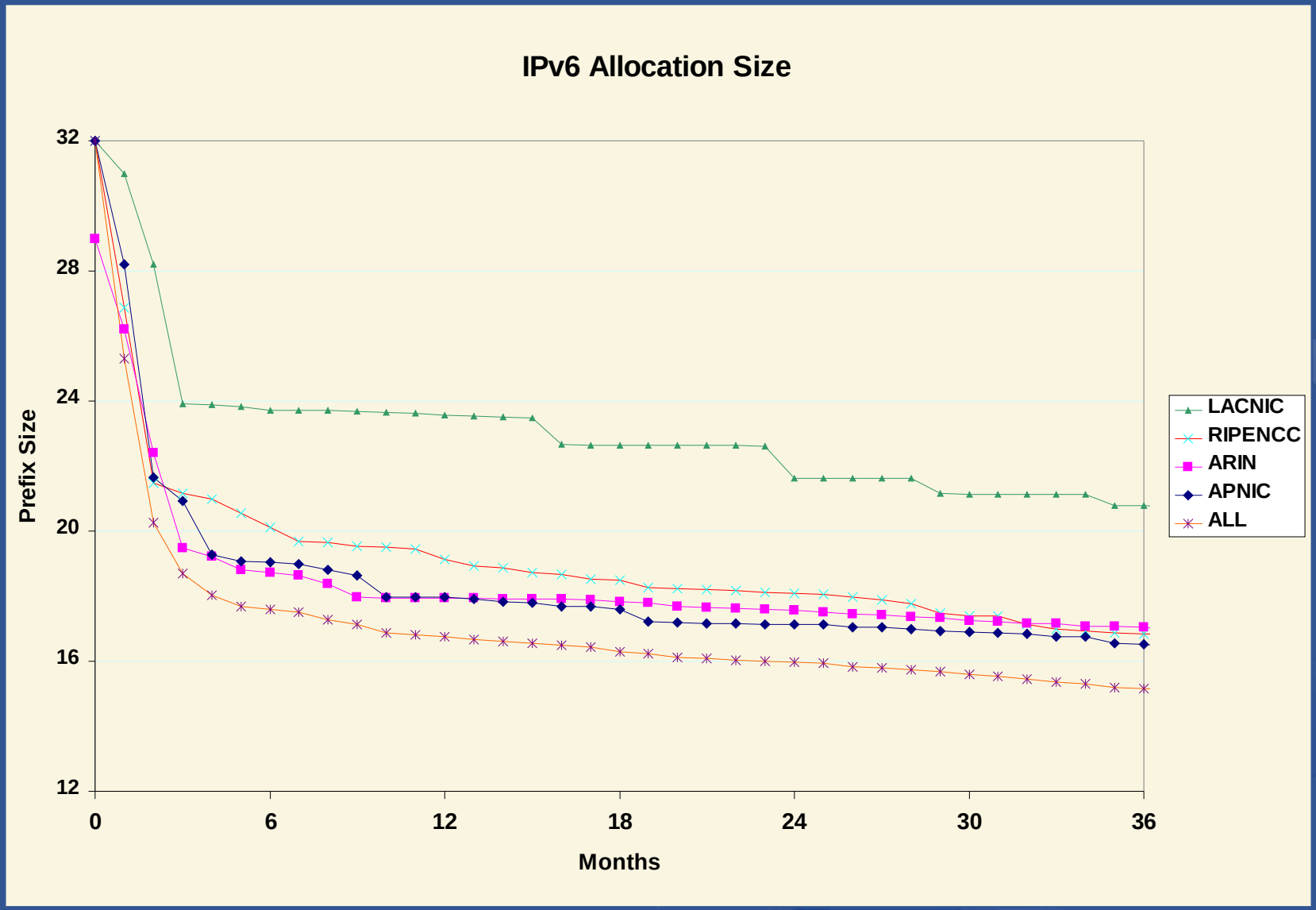
IPv6 Registry simulation exercise

- Use recent RIR IPv4 allocation data to create a demand model of an IPv6 address registry
  - Assume a sequence of IPv6 transactions based on a demand model derived from the sequence of recorded IPv4 allocations
  - Convert IPv4 to IPv6 allocations by assuming an equivalence of an IPv4 end-user-assignment of a /32 with an IPv6 end-user-assignment of a /48
  - IPv4 uses a constant host density of 80% while IPv6 uses a HD-Ratio of 0.8
  - Use a minimum IPv6 ISP allocation unit of a /32

IPv4 / IPv6 Allocation equivalence table

End Customer Size	IPv4 Allocation	IPv6 Allocation
205	/24	/32
410	/23	/32
819	/22	/32
1638	/21	/32
3277	/20	/32
7131	/18	/32
12416	/18	/31
21618	/17	/30
37640	/16	/29
65536	/15	/28
114104	/14	/27
198668	/14	/26
345901	/13	/25
602248	/12	/24
1048576	/11	/23
1825676	/10	/22
3178688	/10	/21
5534417	/9	/20
9635980	/8	/19
16777216	/7	/18

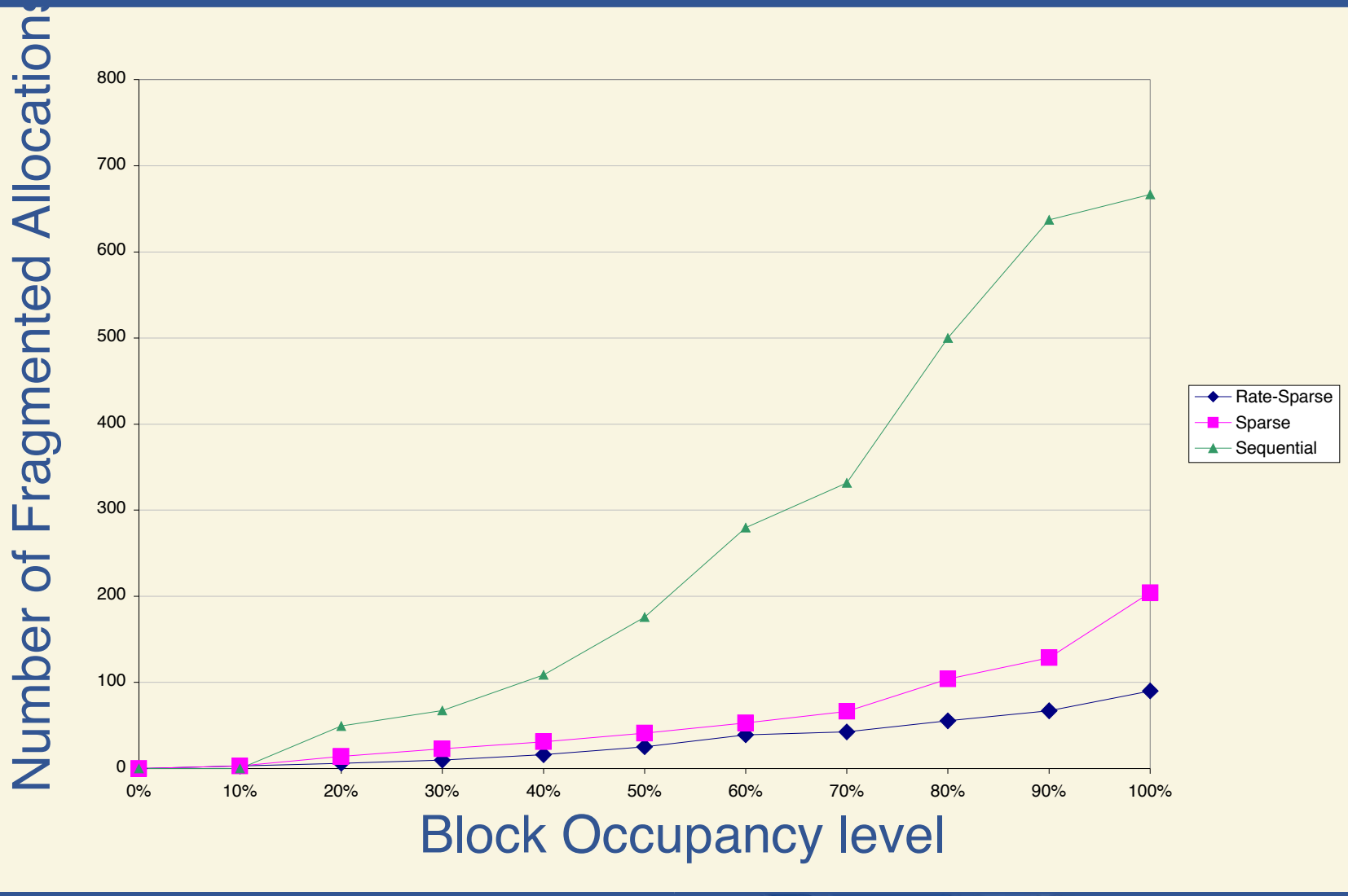
Allocation size simulation results



Management algorithm simulation

- Three algorithms have been compared
  - Sequential
    - Comparable to current IPv4 system, where each new allocation window is drawn from the remaining free pool in sequence
  - Sparse
    - Each new allocation subdivides the largest allocation window in half
  - Rate-Sparse
    - Each new allocation subdivides a window in half, where the selected window is the slowest growing allocation

Management algorithm simulation



IANA to RIR Address block size

- /20 block is smaller than the allocation window of some individual allocations

- /16 block has an anticipated lifetime of 36 months of RIR allocations using current allocation framework
    - /16 would have a lifetime of < 12 months assuming an IPv4 NAT ratio of 2:1

- /12 block has an anticipated lifetime of 36 months with minimal fragmentation under rate-managed sparse allocation, with NATless deployments

Thank you!

- Questions