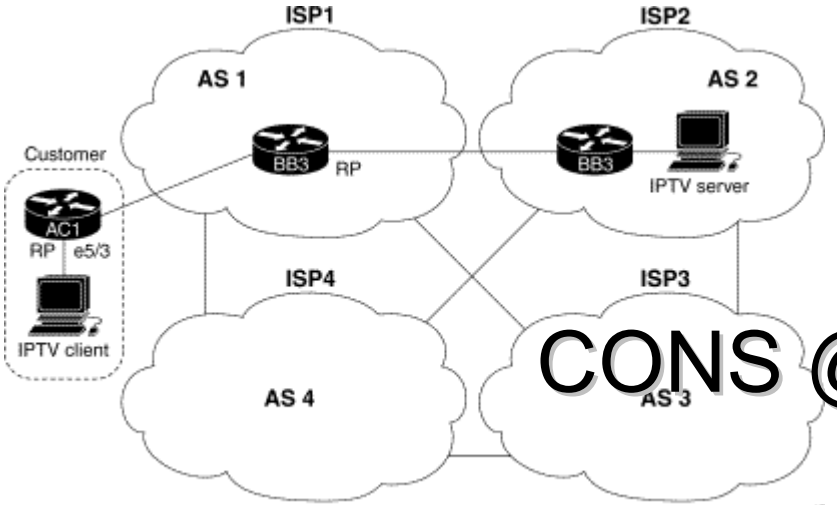
Multicast Address Allocation



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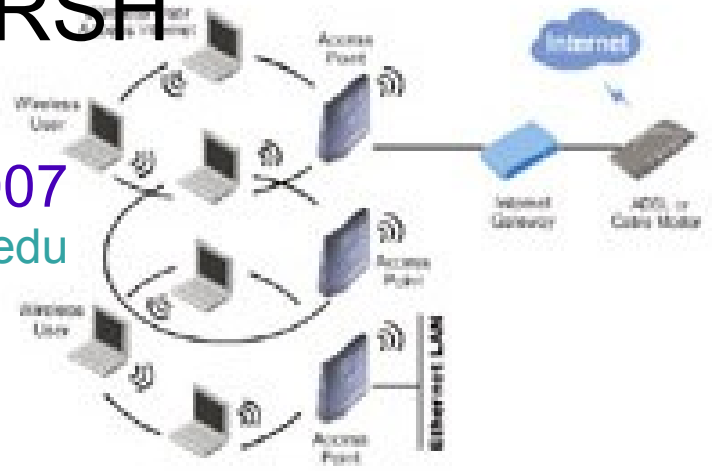

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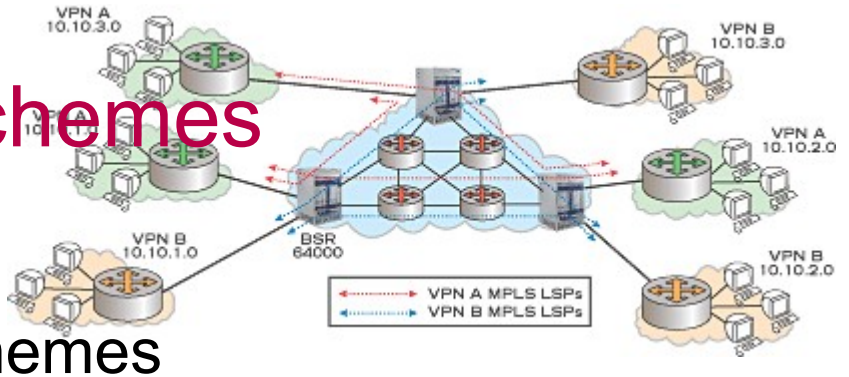
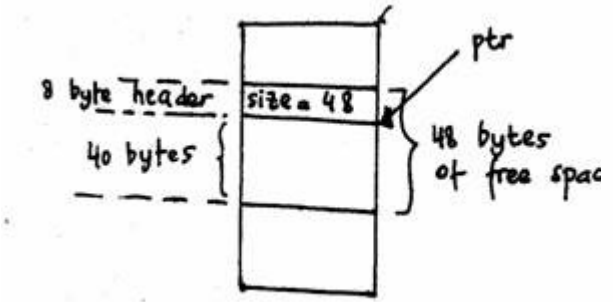
Different Approaches

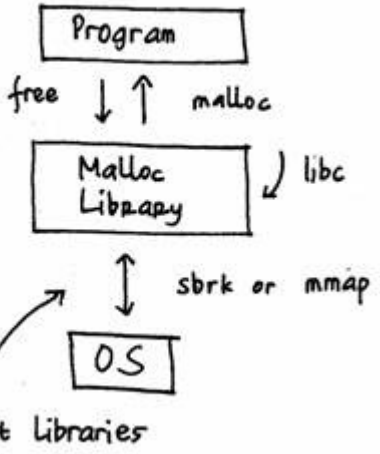
- Static Allocation Schemes
- Flat address allocation schemes
  - IRMA (sdr – Mark Hadley and Van Jacobson)
  - IPRMA (Van Jacobson)
- Hierarchical allocation schemes
  - Contiguous Schemes
    - Prefix based allocation schemes
    - Contiguous Cyclic allocation schemes
  - Non Contiguous Schemes



Characteristics of Good Allocation Scheme

- Ability to successfully allocate addresses while minimizing the number of blocks a child domain holds
  - To keep routing table small
- Minimize the number of times child domain changes address
  - To minimize routing flux
- Maintain high level of utilization





Before we proceed ...

- Multicast address allocation makes sense for Ipv4 (because of its limited multicast address space)
- With IPv6 and alternative multicast protocols like SSM, addressing issue will be resolved
- So why do we care about multicast addressing problem??
  - Because of reluctance of sys admins to use SSM
    - SSM allows each IP host, 16 million multicast addresses
  - Resistance of service providers to migrate to IPv6

Static Allocation Schemes

- GLOP
  - Can be used to assign permanent multicast address to long lived session example TV series broadcast
  - GLOP Addresses are in control of ISPs which have been assigned AS numbers by IANA.
    - But there are only 256 addresses per AS
    - Can not scale to large number of sessions

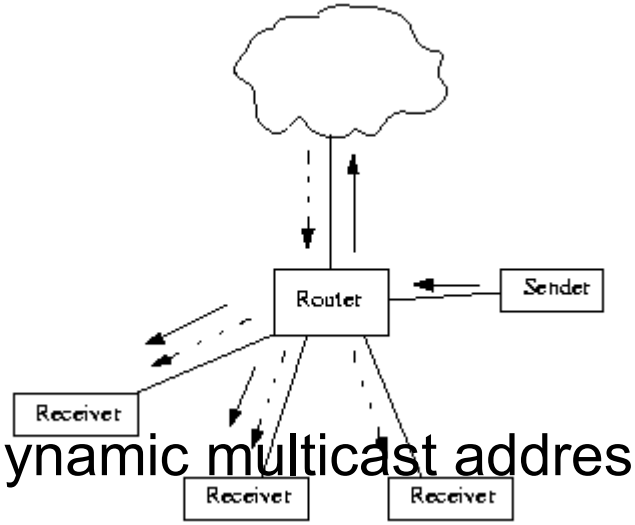
Flat addressing Schemes

- IRMA – Informed Random Multicast Address Allocation scheme
  - Used by sdr, a MBONE session directory tool
  - Address collision on the order of O($\sqrt{N}$)
  - For collision free performance: requires global knowledge of currently allocated addresses
- IPRMA – Informed Partitioned Random Multicast Address ...
  - Whole address space partitioned on the lines of popular TTL boundaries
  - Ideal performance achieved with large number of partitions where address collision improved to O(N)
  - Results in oversubscribed and under subscribed partitions
  - Collisions could still result because of asymmetric TTL scoping

Hierarchical Allocation Schemes

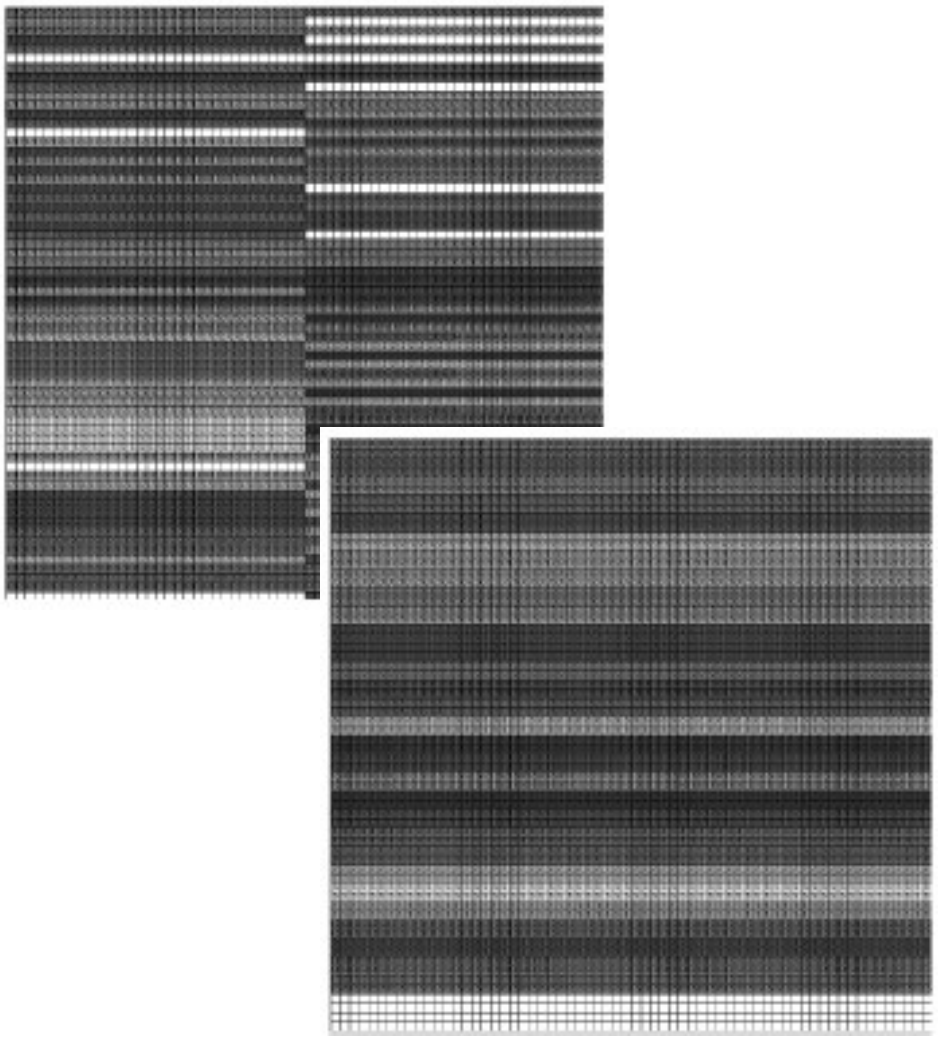
- Prefix based schemes
  - Don't care bits are the trailing bits, ex A8.76.xx.xx
  - Used in MASC proposal
  - May lead to fragmented and unused address chunks
- Contiguous schemes
  - Don't care bits can occur anywhere not only at trailing bits
  - Example: A8.xx.xx.76 (don't care bits may wrap around)
  - Has better address aggregation property (Cyclic)
- Non Contiguous Allocation Schemes
  - Don't care bits do not have to appear together
  - Example: Ax.87.xx.6x
  - Has the best address space utilization capability in theory

MASC



- Multicast Address Set Claim
  - current IETF proposal for hierarchical dynamic multicast address allocation scheme
  - Allows for a child domain to claim a subset of address of its parent domain for allocation purposes
  - The child domain listen for address collision for some long time
  - In case of no collision, it assigns that subset of addresses to MAAS (Multicast Address Allocation Servers) for assignment to individual multicast sessions.
  - Allows for address expansion by migration, doubling etc ...
  - Address Aggregation could be challenging and complex
  - Over time could result in fragmented address space

Non-Contiguous Vs Prefix Based Allocation Scheme



- Simulations based on various load functions for both non-contiguous and prefix based algorithm shows counter-intuitive results
- For large load, prefix based schemes performed better than the other
- Researchers reasoned this observation on how these two algorithms might partition the address space
- Theoretically non-contiguous algorithms should have performed better, but such an allocation algorithm is still not yet known
- RESEARCH TOPIC??????

Our Solution to IPv4 Multicast Address Allocation ...

Topic of next CONS presentation :D

References