Abstract
Over the last few years, application-layer multicast (ALM) has emerged as a plausible solution for supporting group-oriented applications. However, ALM suffers from inefficiency due to its reliance on end hosts and ALM can require significant changes at both the server and client applications. In short, we outline an approach entitled PALM (Passive Application Layer Multicast) that removes the need for changes to the server or client applications while allowing for dynamic discovery of supporting network devices and client-side OS modules. The passive nature of the approach comes from the fact that bandwidth savings occur transparently with zero required modifications to the networking environment, similar to approaches such as web caching.

Key Benefits
• No changes to server
• Allow heterogeneous clients
• Dynamic group detection
• New service opportunities

PALM Operation
• Virtual Group Detection Manager (VGDM)
• Type of Devices
  • ALM Helper Device (AHD)
  • ALM Client (AC)
  • Non-ALM Client
• Transport
  • End System Multicast (ESM)
• Device Discovery
  • Dynamic ALM Discovery

How does PALM work?
1. The application transmits packets to multiple clients with the same data payload (L7).
2. At the VGDM, packets with the same source IP, source port, packet size, and payload signature (checksum to access uniqueness) are queued inside a virtual group.
3. The virtual group is released for transmission via the ALM transport mechanism. Non-ALM clients significantly separated from the ALM distribution tree may also have their packets sent onwards using unicast.
4. ALM packets are sent onwards towards either AHDs or ACs in the ALM distribution tree. Packets are appropriately replicated to downstream members of the ALM distribution tree.

Simulation Results:
• The band-width follows an appropriate trend whereby unicast performs significantly worse than both ESM and PALM.
• The End-to-End delay in PALM is not significantly impacted by the overhead applied by VGDM
• With a sufficient client base, the benefit of PALM can be quite compelling;

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