

BANDWIDTH OPTIMIZATION

THE NETWORK OPERATOR CHALLENGE

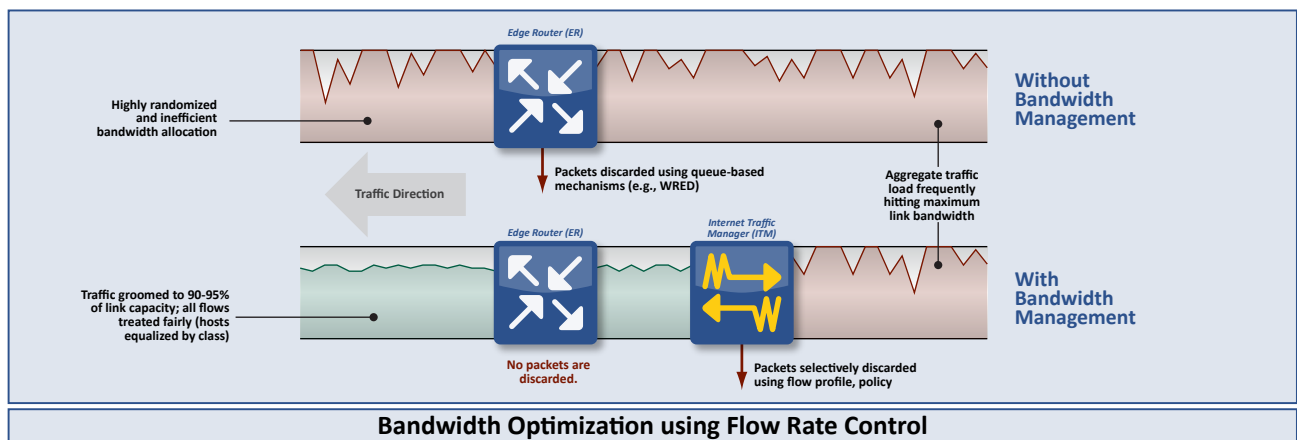
Prevailing architectural approaches used to build and operate broadband networks—both fixed and mobile—result in two undesirable yet seemingly unavoidable characteristics: (1) high backhaul bandwidth costs, and, (2) non-deterministic performance. Together, these attributes weaken the profitability of broadband services and impair the ability of broadband operators to minimize churn and maximize market share.

Broadband operators of all types have long struggled to balance service pricing and service determinism or quality. In almost all networks, delivering on the first of these attributes necessitates building networks that ‘oversubscribe’ aggregate user connections. For example, employing a Gigabit Ethernet Internet backhaul connection to deliver a 5Mbps service to 4,000 subscribers; a 20-1 oversubscription ratio. While this is an economically prudent approach and reflects the statistical nature of most Internet traffic, it results in a service exhibiting highly variable performance characteristics. This network design practice can also result in severely degraded performance for applications that are not highly statistical in nature—streaming over-the-top (OTT) video being the best example.

In attempting to resolve this discordance, broadband operators often resort to “throwing bandwidth at the problem,” thereby reducing the oversubscription ratio. But this approach not only raises bandwidth costs, it still does not resolve the underlying technical inefficiencies that result in highly variable (and occasionally unacceptable) performance.

THE ANAGRAN DIFFERENCE: BANDWIDTH OPTIMIZATION USING FLOW RATE CONTROL

Anagran Internet traffic management (ITM) solutions directly address the underlying technical weaknesses associated with current broadband architectures while still fitting seamlessly within the current architectural model. The result is a dramatic reduction in bandwidth costs coupled with a substantial improvement in performance, measured in terms of subscriber throughput.



Anagran's Internet traffic manager (ITM) flow rate control systems accurately manage the rate of every flow with the composite rate of all flows in any subset of the traffic to be maintained within 90 percent of the capacity of a multiplicity of network congestion points.

From a macro perspective, a flow rate control-enabled network element looks into a flow table and finds a match for the "protocol five-tuple" that defines the flow (source and destination IP address, protocol type, source and destination TCP port number). These packet fields determine where and how the new packet should be sent on the same route computed for the first packet of the flow. The flow rates, as well as other behavioral parameters, are collected that allow the TCP flow rates to be precisely controlled at the input to the system. If the flow rate is excessive, one and only one packet is dropped such that the TCP flow operates at precisely the rate that the flow should be allowed. Clearly if all flows could be managed at an aggregation point, the total rate of any group of flows could be controlled such that when that group arrived at a congestion point there would be no need for delaying packets or for dropping packets randomly at the congestion point.

BENEFITS

Three critical benefits are realized when deploying Anagran ITMs: 1) significant improvement in the users' quality of their Internet experience, 2) material improvement in network capacity utilization, lowering the service provider's CAPEX and OPEX, and 3) increased revenue generation opportunities through the delivery of tiered services.

Anagran products:

- Manage individual TCP flows so as to eliminate inherent inefficiencies. In practical terms, this means applying greater intelligence to inevitable packet discards in order to ensure that all flows of a similar class are treated fairly and the TCP slow starts and stalls are completely eliminated. This yields a fairer and more deterministic network experience for all users.
- Reduce the ability of certain applications (e.g., peer-to-peer) to "game the system" by employing multiple flows per session. This reduces aggregate bandwidth requirements and also contributes to fairness between users.
- Allocate bandwidth in such a way the "bulk" applications such as file transfers yield bandwidth to quality sensitive applications such as VoIP and streaming video and "fill the valleys" when these applications are relatively idle. This also reduces overall bandwidth requirements while radically improving performance for quality sensitive applications.

Anagran's Internet traffic manager, the FR-1000, represents a new class of equipment deployable in wireline, cable, and wireless broadband networks without modifying the underlying topology of these networks. Designed to snap into current architectures, the FR-1000 produces significant OPEX savings through a reduction in backhaul bandwidth requirements and improvement in the Internet experience for all users.



www.anagran.com
Anagran, Inc., 580 North Pastoria Ave., Sunnyvale, CA 94085, USA, +1.408.701.0880.

Copyright © 2011 Anagran, Inc. All rights reserved. This document is protected from unauthorized copying and use by national copyright laws and international conventions. All information in this document is subject to change without notice. Anagran and the Anagran logo are trademarks of Anagran, Inc. All other trademarks are the property of their respective owners. Anagran reserves the right to change specifications or to discontinue products at any time.