## What is Traffic Shaping?

Traffic shaping (also known as packet shaping) is bandwidth management technique that delays the flow of certain types of network packets in order to ensure network performance for higher priority applications. Traffic shaping essentially limits the amount of bandwidth that can be consumed by certain types of applications. It is primarily used to ensure a high quality of service for business-related network traffic.

The most common type of traffic shaping is application-based traffic shaping. Fingerprinting tools are first used to identify the application associated with a data packet. Based on this, specific traffic shaping policies are applied. For example, you might want to use application-based traffic-shaping to throttle peer-to-peer file sharing, while giving maximum bandwidth to a business-critical application such as Voice-over-IP (VoIP), which is especially sensitive to latency.

### **Why Traffic Shaping is Important**

Limited network resources make bandwidth prioritization a necessity. Traffic shaping is the one of the most important techniques to ensure a high quality of service for business applications and data. It is an essential requirement for a network firewall.

Other info:

https://www.techtarget.com/searchnetworking/definition/traffic-shaping

Traffic Shaping: -

The bandwidth for each channel is controlled by the priorities and settings of the Traffic Scheduler.

## Credit-Based Traffic Shaping Algorithm

<https://docs.amd.com/r/en-US/pg051-tri-mode-eth-mac/Credit-Based-Traffic-Shaping-Algorithm>

A diagram of a computer network

Description automatically generated

As shown in above figure, data for transmission over an AVB network can be obtained from three types of sources.

The transmitter (TX) arbiter selects from these three sources in the following manner:

* If there is AV data available and the programmed AV bandwidth limitation is not exceeded, then the AV packet is transmitted
* otherwise, the TX arbiter checks to see if there are any PTP packets to be transmitted
* otherwise, if there is an available legacy packet, this is transmitted.

The Ethernet AVB Endpoint uses configuration registers to set up the percentage of available Ethernet bandwidth reserved for AV traffic. To comply with the IEEE802.1Q specification these should not be configured to exceed 75%. The arbiter then polices this bandwidth restriction for the AV traffic and ensures that on average, it is never exceeded. Consequently, despite the AV traffic having a higher priority than the legacy traffic, there is always remaining bandwidth available to schedule legacy traffic.

The relevant configuration registers for programming the bandwidth percentage dedicated to AV traffic are defined in [Configuration and Status](https://docs.amd.com/r/aHIVLD3sFpYD~dvBT3HAYg/QesZINEPkT68pJrXdGy9Ug) and are:

* [TX Arbiter Send Slope Control Register](https://docs.amd.com/r/aHIVLD3sFpYD~dvBT3HAYg/M2sCmEbtQ8axk10QCYTbIA)
* [TX Arbiter Idle Slope Control Register](https://docs.amd.com/r/aHIVLD3sFpYD~dvBT3HAYg/4nd_FStvaWZ0w~zx~LsxcQ)

To enforce the bandwidth policing of the AV Traffic, a credit-based shaper algorithm is implemented in the TX Arbiter. The following figure illustrates the basic operation of the algorithm and indicates how the TX Arbiter decides which Ethernet frame to transmit.

## Credit-based fair queuing

**Credit-based fair queuing** is a computationally efficient alternative to [fair queueing](https://en.wikipedia.org/wiki/Fair_queueing).

Credit is accumulated to queues as they wait for service. Credit is spent by queues while they are being serviced. Queues with positive credit are eligible for service. The rate of credit accumulation and release can be adjusted on a queue-by-queue basis to produce a weighted queuing behavior.

