Contact us for more information
U.S. & Canada:
+1.800.763.3423
Outside U.S. & Canada:
+1.937.291.5035

The FX Series' Traffic Shaping Optimizes Satellite Links

February 2011

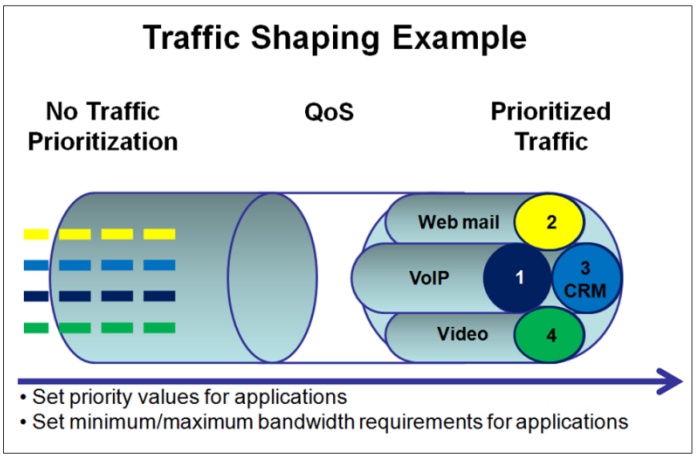
Traffic Shaping or Quality of Service (QoS) is the ability of the network to use queuing to provide preferential treatment to certain classes of traffic. The FX Series Traffic Shaping features ensure on-time delivery of time-critical information through specific port assignments, priorities and policies that can be assigned at the database-level, guaranteeing QoS for critical applications. The FX Series Traffic Shaping allows different traffic classes to be assigned to individual applications, such as email and VoIP. These traffic classes are used to provide different levels of service quality. This allows administrators to define the "Quality of Service" attributes used to control traffic based on either "Traffic Classes" or "Bandwidth Pools".

For applications delivered over satellite networks, each application may have different delivery requirements, and business conditions may determine that certain priority levels are given to specific types of traffic. Network administrators use QoS to support diverse applications over satellite links to ensure each application receives the appropriate level of service when competing for limited satellite link bandwidth.

Traffic Prioritization

Traffic Prioritization shapes bandwidth utilization so that capacity requirements for mission-critical applications are always met. By controlling the transmission of specific applications, administrators are able to keep within bandwidth limits and to prioritize applications over satellite links.

Quality of Service (QoS) is used to classify and prioritize network applications based on business objectives to guarantee optimal application performance regardless of network conditions by assigning priority or bandwidth guarantees and limits for each application. Satellite links are subjected to limited amount of bandwidth. QoS traffic management enables network administrators to define preferential treatment for certain classes of traffic. For hub deployments, QoS provides TCP rate controls and priority levels capable of to supporting many remote sites, while, remote sites use QoS to prioritize applications and user types.



The FX Series Traffic Shaping allows administrators to classify and prioritize network traffic to improve application performance over satellite links.

Even with proper QoS priorities in place, applications with large file transfers, such as CIFS, FTP, and backup systems can starve real-time applications such as VoIP and streaming media (e.g. video). Even if a real-time application has priority, the bulky nature of large-transfers takes too long to clear the satellite link - even when queuing and traffic shaping are enabled. The added latency that results can make a critical application such as VoIP impossible for many remote sites. To address this problem, Stampede's FX Series reduces the size of data packets, and intelligently manages packets based on satellite link capability and application profiles.

The FX Series Traffic Shaping is a powerful feature which ensures on-time delivery of time-critical information. Through specific port assignments, priorities and policies that can be assigned at the database-level, guaranteeing Quality of Service for critical applications. The FX Series Traffic shaping feature allows different traffic classes to be assigned to individual applications, such as email and VoIP. This allows administrators to define the "Quality of Service" attributes used for traffic control based on either "Traffic Classes" or "Bandwidth Pools".

Bandwidth Characteristics and QoS Definitions

Administrators can define service quality levels by assigning TCP ports and other traffic control properties to a logical (QoS) name. These QoS definitions can subsequently be applied to web application policy documents.

QoS name – Specifies the logical name to assign to this QoS definition. This name is what is used to reference the definition in the web application policies.

Port number – Specifies the TCP port number to be used when this QoS definition is applied in a web application policy.

Type of Service – Allows the FX Series appliance to either preserve or set the type-of-service (ToS) bits in the IP header. If "Preserve" is chosen, the FX Series will preserve the ToS bits on requests from the clients and responses from the application servers. If "Set" is chosen, the FX Series will set the ToS bits based on the binary value in the "DSCP value" field. DSCP is an abbreviation for "Differentiated Services Code Points".

Outbound bandwidth (Kbits per second) – This is the amount of bandwidth available for sending from the FX Series appliance to the satellite link. A value can be specified between 96 and 1 million.

Traffic Classes – This allows administrators to define rate guarantees and ceilings to six different classes of traffic. Administrators can then assign these classes to Quality of Service (QoS) definitions that will in turn be assigned to application policies. The FX Series 4000, located in the satellite operations center, enforces these rate controls when communicating with an FX Series 1000 remote appliance. The FX Series 4000, working in conjunction with FX Series remote appliances, uses the industry standard Hierarchical Token Buckets (HTB) queuing discipline to implement a sharing hierarchy that provides guaranteed bandwidth rates and ceilings as a percentage of the total bandwidth available.

The six traffic classes are in a hierarchy of 0-5 with class 0 being the lowest in the hierarchy and class 5 the highest. Each of the six traffic classes is assigned a guaranteed rate as a percentage of bandwidth available. A lower class may "borrow" additional bandwidth from a higher class if the higher class is not using its guaranteed bandwidth allotment. Each class may "borrow" up to its rate ceiling.

By default, each rate ceiling is 100 per cent. The total "guaranteed" bandwidth of all six classes must add up to 100. The following chart reflects the traffic classes and the default guaranteed rate and ceilings.

Class Name	Guaranteed Rate	Ceiling
5: Interactive Media and Voice	35	100
4: Streaming Multimedia	25	100
3: Business Critical	20	100
2: Standard	14	100
1: Background	5	100
0: Best Effort	1	100

Stampede Support for Bandwidth Pooling

Bandwidth pooling is used by satellite Internet service providers to enforce a rate limit on traffic coming from their head-end out to different subnets. It allows them to define a pool, and associate a maximum bit-rate to that pool. With a defined pool, subnets are then defined as part of the pool. The FX Series

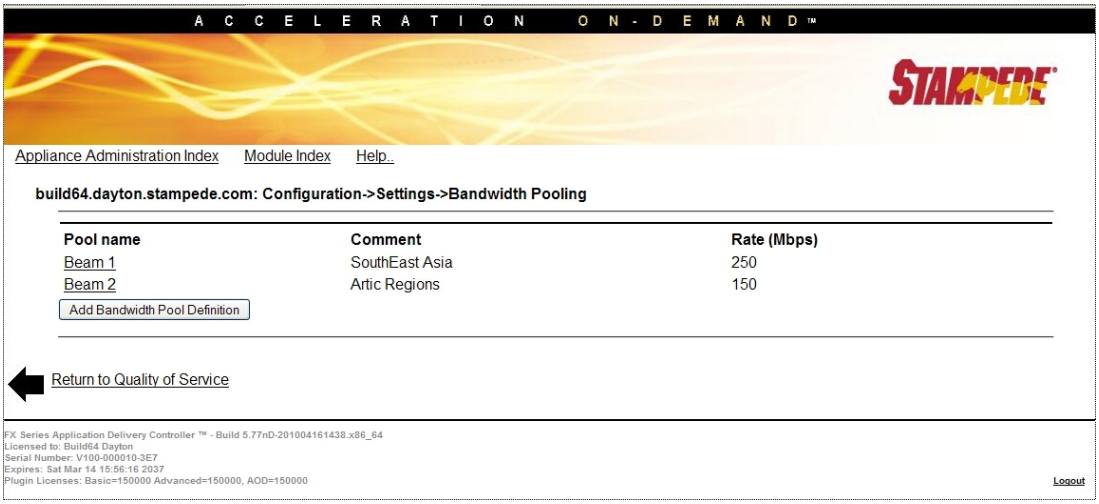
enforces the traffic limits based on the network administrator-defined throttle of the bandwidth pool so that the data going through the pool does not exceed the specified parameters. For example, a subnet may be able to burst up to the full size of the link as long as no other traffic is contending for the available bandwidth. The FX Series allows satellite Internet service providers to more effectively utilize their bandwidth over a range of subnets without setting artificial limits that many edge devices require. Rather than having the rate pacing handled on an edge device, the FX Series takes over this process with high-performance processing designed for limiting user requests from Web servers based on the bandwidth pool constrictions.

A bandwidth pool consists of a record that includes a name, rate and subnet that belong to a specific pool. A satellite Internet service provider can associate a carrier (or beam) to a bandwidth pool. In this case, a bandwidth pool corresponds to a specific satellite traffic beam. For administrators, the problem arises when assigning separate subnets over a single beam that may have any number of associated subnets.

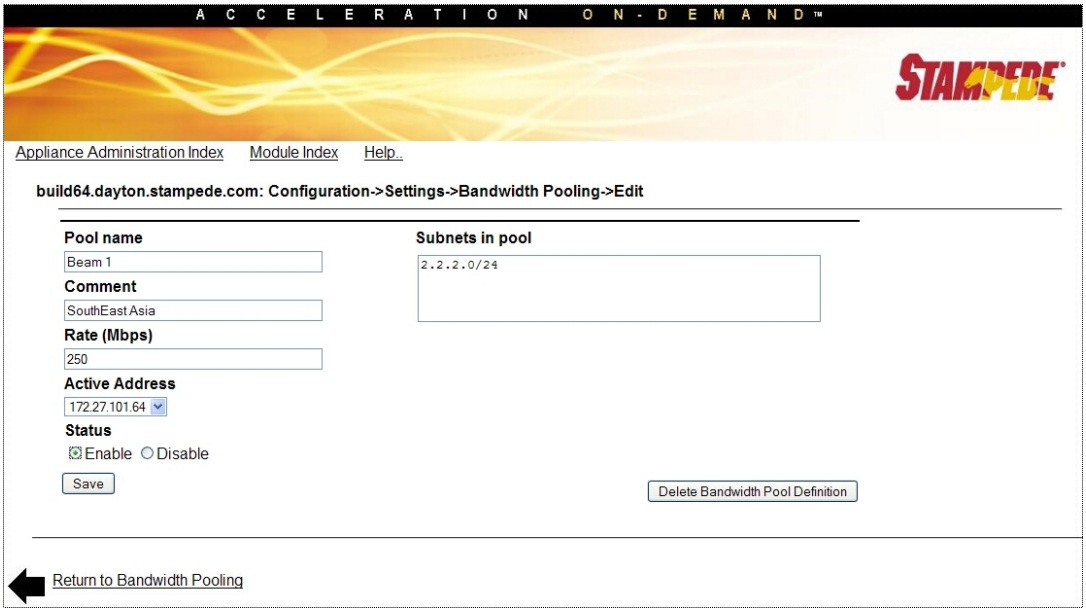
The FX Series allows the administrator to restrict the data flow over a beam based on how they defined the subnets to their customers. This enables them to apply QoS to the subnets, and have greater control over the re-transmission requirements for each subnet. This also alleviates the network architect or engineer from having to change each individual subnet, rather than having to individually shape each subnet so that all the subnets equal the total amount of bandwidth available for a single beam. The FX Series greatly simplifies this process by allowing network administrators to easily input the maximum rate for a particular beam (or carrier), and the subnets, and ensures that the traffic load will not exceed the rate. This also provides greater bandwidth flexibility by not enforcing an artificial rate limit on a per-subnet basis.

The FX Series takes traffic control to a new level. Stampede developed an easy-to-use Web GUI around the complex rate shaping technology that is built into the FX Series. With the Web GUI, network personnel are able to easily configure bandwidth pools. The FX Series Web GUI allows administrators to define a bandwidth pool and give it a rate, then add separate subnets to that pool. The FX Series appliance then dynamically throttles the traffic according to the specifications of the pool.

Below are sample screen shots of the FX Series Web interface for managing bandwidth pools.



This screen is a pick list for editing existing, or adding new bandwidth pool definitions.



This screen allows you to define pools of bandwidth that can then be shared by pool members that are included based on their subnet.

Pool name: This is the name of the bandwidth pool. This field is required and must be unique
.
Comment: This is an optional comment field that provides a place to store important notes associated with this bandwidth pool.

Rate (Mbps): This specifies the bandwidth in fractional megabits per-second that will be allocated to this pool. The default is 1000 (1 Gbps).

Active address: Specifies the Ethernet port that the output traffic to the pool members will be controlled.

Subnets in pool: Enter the subnets in CIDR format. Multiple subnets can be entered on separate lines, or separated by commas.

Status: Indicates if this bandwidth pool is enabled or not. If "Disabled" is selected, then the bandwidth pool will not become operational when the bandwidth pool definitions are processed.