Bandwidth Allocation: Static vs Dynamic

A Study of the Utility Levels Derived from any Transport Medium Based Upon the Two Methods of Bandwidth Allocation.

To understand the differences between the two methods, one first needs to understand the attributes and requirements of various applications. There are four different applications to review:

Voice: A constant bit rate application with high sensitivity to delay and jitter on the transport.
Video: A variable bit rate application with high sensitivity to delay and jitter on the transport.
Data: A variable bit rate application with varying degrees of sensitivity to transport delay.
Internet: A variable bit rate application with no degree of sensitivity to transport delay and jitter.

An Introduction to the Static Method in Bandwidth Allocation
The Static Allocation of bandwidth within any physical medium (T-1 for example) requires that the bandwidth be divided into various segments for each service. The amount of bandwidth per service is decided upon and configured accordingly. Once set, this bandwidth remains statically assigned and is fully insensitive to the varying bandwidth needs of the various applications. Although one application may not be in use, the bandwidth allocated for that application will remain unused.

An Introduction to Dynamic Method in Bandwidth Allocation
The Dynamic Allocation of bandwidth is completely different from Static Allocation in that the allocation is not pre-set by the circuit design but is automatically allocated by the demands of the applications. The allocation decision is based upon each applications' attributes and bandwidth requirements at that exact instant in time which means that if one application is not in use, the bandwidth does not remain unused. It will be allocated dynamically where needed.

A Comparison

Based on the above information, it is easy to see that if one intends to converge multiple applications with varying attributes and requirements over a single facility, dynamic allocation of the bandwidth will provide a far better utility than its counterpart. One disadvantage of static allocation is the non-utility of idle bandwidth during the absence of its respective application. Another disadvantage is the inflexibility of the static method in allowing certain applications, such as data and Internet, to fully utilize all idle bandwidth during their bursting periods.

While comparing the two methods, one quickly realizes the superiority and extreme utility derived from a transport medium, such as T-1, when the medium is designed to offer bandwidth to a demanding application on a dynamic basis. Findings suggest that the utility derived from a dynamically oriented medium are as high as two times the utility derived from a statically segmented medium.

In Conclusion

The idea behind the convergence of multiple applications over one shared facility stems from the need to increase utility and decrease cost and complexity. For this very reason, static segmenting of transport bandwidth is counter-effective and is being replaced by the dynamic method of bandwidth allocation. For many companies, their "shortage of bandwidth" can be at least partially addressed by the more dynamic and efficient use of the bandwidth.