



White Paper

Token-Ring and Ethernet Integration

1 Executive Summary

In recent years prices have dropped on Ethernet adapters, hubs, and switches. At the same time Ethernet speeds have increased from 10 Mbps to 100 Mbps to 1 Gbps. These developments, despite the numerous performance and technical advantages of Token-Ring technology, have led some Token-Ring Network Managers to begin looking at Ethernet as a possible solution when upgrading their Token-Ring networks to higher speeds. Some Network Managers are also convinced they will save money by doing so.

Our "Cost of Ownership" analysis, which includes tangible costs such as new equipment, installation-related costs such as cabling changes and intangible costs such as network planning and staff retraining, shows that installing dedicated 16 Mbps switch connections to every desktop and 100 Mbps full-duplex Token-Ring in the backbone in an existing Token-Ring network is much less expensive than migrating that same network to Ethernet with dedicated 100 Mbps switch connections to every desktop in a 500 node network. Considering equipment costs alone, our calculations show that price-per-megabit-per-workstation is less expensive for migrating to 16 Mbps full-duplex switched Token-Ring to the desktop than migrating to Ethernet.

The higher speed and inherently more efficient operation of Token-Ring means that, in some configurations, the 16 Mbps full-duplex switched desktops will run as fast as 100 Mbps Ethernet connections. A switch from Token-Ring to 100 Mbps Ethernet at the desktop might not result in the expected improvement in overall network performance. The maximum per-link bandwidth efficiency of a Token-Ring link is 98%; this means a 100 Mbps full-duplex Token-Ring link provides you with up to 196 Mbps of throughput. An Ethernet network will start experiencing performance problems, application time-outs and intermittent lost connections at much lower levels of network utilization. Token-Ring on the other hand runs better under load; this means that a Token-Ring network will not experience these performance problems, even if the network utilization reaches 98%.

Capabilities inherent in Token-Ring make it a more robust solution for the future. This paper does not consider the necessary cost of subsequent upgrades and extensions to Ethernet to build in capabilities already present Token-Ring (file transfer efficiency because of Token-Ring's large frame sizes and Class-of-Service, or priority mechanism).

An incremental Token-Ring upgrade can be implemented quickly and easily. A "one-time" move to Ethernet is far riskier, more complex and could involve a higher degree of service interruption. Where coexistence of Token-Ring and Ethernet networks is required, translational-bridging products can be used to effect a seamless integration between the two technologies.

Therefore, not only does it make economic sense for a Token-Ring customer to stay Token-Ring, but it is technically advantageous as well.

2 Token-Ring Networking

Token-Ring networking today enjoys a customer base of more than 15 million users (according to International Data Corp.), chiefly residing in the largest corporations in the world that depend on their networks for mission-critical applications. Token-Ring users chose the technology for its inherent robustness, reliability and efficiency in large enterprise environments. For many Token-Ring Network Managers today, migrating away from the networking technology that has served them well for so many years makes little sense on the grounds of performance, functionality and cost. The argument of cost is perhaps the most important issue to address.

3 Understanding the Issues

Recent advances in the bandwidth capabilities of Ethernet technology – including the introduction of “Gigabit” Ethernet – have generated considerable enthusiasm in the trade press. For established Ethernet and “Fast Ethernet” installations, the marketing message from product vendors is that Gigabit Ethernet is the “logical next step” for network evolution.

While this may be an accurate assumption for existing Ethernet networks, it is not a cost effective alternative for existing Token-Ring networks. The bottom line is that before migrating any portion of the Token-Ring network to Ethernet, Network Managers, IS Managers and CIOs must understand all of the technical and economic tradeoffs involved in such a transition.

4 Maintaining Token-Ring makes Financial Sense

While many believe that Ethernet is the most cost-effective forward path for the enterprise network, this is simply not true for existing Token-Ring network installations. Central to this claim is the notion of “Total Cost of Ownership.” While direct equipment cost is the most visible factor in calculating an upgrade, many installation-related, as well as several intangible cost factors must be figured in to the equation to arrive at your final cost of upgrading.

The total cost of delivering either dedicated 100 Mbps Ethernet connections to each desktop exceeds the cost providing dedicated 16 Mbps full-duplex Token-Ring connections to each desktop.

4.1 Cost of Ownership Defined

Total Cost of Ownership (TCO) analysis seeks to determine the actual cost of a technology acquisition or upgrade by calculating both the tangible and intangible costs associated with the upgrade. When applied to an array of upgrade options, TCO provides a means for evaluating these options on a “like for like” basis. The technique assumes that all options are equally valid from a technical standpoint (i.e. that they each provide a solution to the underlying business problem) and that the discriminator being sought to facilitate a decision is one of cost.

4.2 Tangible vs. Intangible Cost Factors

Tangible costs include the purchase of new network equipment such as switches, routers, hubs and Network Interface Cards (NICs) for servers and desktop computers. However, in addition to direct equipment costs, network upgrades may entail significant installation related costs for infrastructure improvements such as new network cabling, NIC installation, as well as the cost of network device and application reconfiguration. In addition to tangible expenses, network upgrades may entail significant intangible costs that are unpredictable in nature. The intangible costs included in this TCO analysis include factors such as migration planning, new skills and training acquisition, new network management tools acquisition, end-user support and, of course, network downtime.

The range of tangible and intangible cost categories begins to suggest the complexity of a TCO cost estimate and, by contrast, the inefficacy of simple cost comparisons based solely on equipment acquisition costs.

5 Token-Ring and Ethernet Integration

Madge Token-Ring products allow you to upgrade your existing *shared* Token-Ring network to 16 Mbps, full-duplex, switched connections at every desktop. This solution provides 32 Mbps of usable bandwidth for every user, 100 Mbps full-duplex switching at the backbone and does not require any changes in cabling, end user stations, printers or server connections.

Madge also provides very fast layer-2 Ethernet translational-bridging solutions for seamless integration to Ethernet based LANs. Ethernet translational-bridging modules can be installed either in the backbone switches or in the wiring closets. Madge solutions include 10/100 Mbps Ethernet connections using the DeskStream and backbone Ringswitches. The Madge Gigabit Ethernet module works with the Backbone Ringswitch to support connectivity to a Gigabit Server or Switch. The Ethernet integration products allow you to grow your network with Ethernet technology without having to change out the entire Token-Ring network. The following diagram shows where Token-Ring and Ethernet integration can take place in a network.

