# Switch*less* Switching Lowers the Cost of Digital Video

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No one debates that ATM is powerful, but the cost of deploying an ATM network on any scale is usually justified only when there is a need for high bandwidth, real Quality of Service, or both. ATM's well-known QoS capabilities are very useful for networks mixing traditional data service with interactive services such as two-way voice and video, and ATM scales from the desktop to Gigabit speeds. But enterprise networks that have already deployed ATM are finding that, while the network performs extremely well, expanding it can be expensive.

ATM's high performance and cost vs. Ethernet's ubiquity and low cost has resulted in the "ATM in the Backbone / Ethernet at the workgroup" mantra. This is unfortunate because it tends to limit the use of applications that can truly benefit from ATM's characteristics, such as two-way video conferencing, remote monitoring, and distance learning.

But now video can be deployed over ATM *without* ATM switches, and existing switches can be expanded *without* adding more ports.

**Cost per Port**

The "cost per port" figures commonly used to gauge network switch costs can be deceiving. Today, a full-up ATM switch can cost less than $550 per OC3 port, down from well over $1,000 a few years ago. But the cost-per-port skyrockets if you only need a few ports. Worse, when you run out of port capacity on a full-up switch, you may need to add an entire new switch just to add a few more ports…bringing the real cost-per-port up to ridiculously high levels.

In the early days of ATM, network managers concerned themselves with a switch's non-blocking capacity which is usually characterized by the switching fabric or backplane. Today, switching capacity is much less of an issue. Switches capable of handling 5, 25, and even100 Gbps are now available and support not just OC3 but OC-12 and OC-48. These capacities give managers freedom to deploy OC3 everywhere…if they have the physical ports and fiber.

**Free Bandwidth!**

Even the most heavily used ATM-connected servers may not deliver a full155 Mbps. While Unix servers do better, NT servers tend to be limited by PCI bus performance and other performance bottlenecks. Typically, most servers top out well below 130 Mbps and PC's fare far worse. This is not to suggest ATM is not a good choice for servers, workgroups, or workstations. But it illustrates that most OC3's have bandwidth to spare since the devices they connect usually cannot "drink from a fire hose".

What's more, ATM by its nature can easily "carve out" any amount of bandwidth on any port for needed applications (such as video)

**Digital Video Bandwidth**

VBrick uses MPEG to deliver true TV-Quality video and CD-Quality

audio using only 1 to 4 Mbps. Considering the capacity of an OC3, that's 1/155$^{th}$ to 4/155$^{th}$ of a fiber. That's 0.7% to 2.8% of the payload capacity. In other words, a single ATM OC3 can carry over 130 full duplex video channels. And if you were to "steal" 2/155$^{th}$ of the bandwidth from practically any existing application, it would likely go unnoticed.

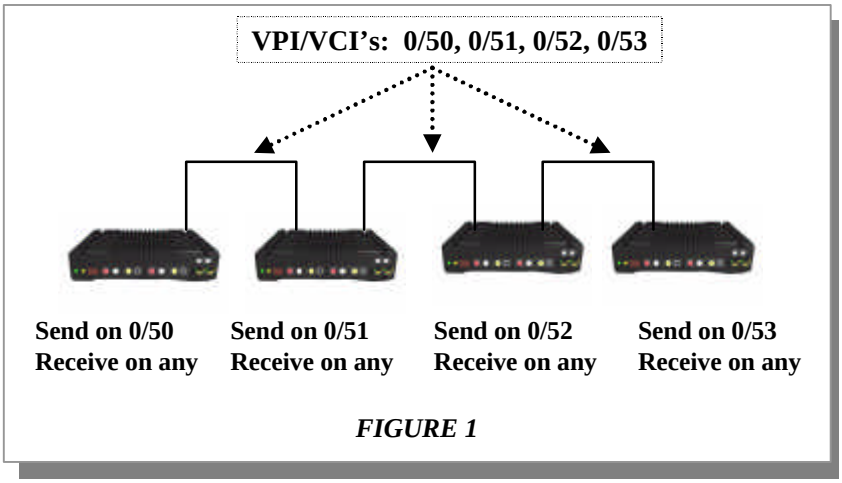


*FIGURE 1*

**VBrick Integral ATM Switch**

VBrick's dual OC3 port option is extraordinarily easy to use. This three-port switch automatically passes all VP's and VC's from one OC3 port to the other, while switching selected VP/VC's to the VBrick MPEG encoder/decoder. Unlike most ATM switches, the VPI and VCI's are configured *automatically*. Any VPI/VCI present one OC3 port is automatically switched to that same VPI/VCI on the other OC3 port. In other words, VBrick's Integral ATM Switch is invisible…behaving more like a piece of fiber than a switch!

**Switchless ATM**

VBricks can be easily "daisy-chained" via OC3 *without* needing connection to a traditional ATM switch. Figure 1 shows four VBricks interconnected via OC3 without a backbone switch. Each VBrick is sending audio/video on a unique VC, and that VC is "seen" by all other VBricks in the chain. Any VBrick can instantly select which VPI/VCI it will decode, thereby "changing the channel". For example, the first VBrick is sending on 0/50, the second on 0/51, the third on 0/52, and the forth on 0/53 (any VPI/VCI could be used). VBricks simultaneously send on *both* OC3 ports, and also simultaneously switch all VP/VC's from port to port. And because all ATM VBricks allow the Transmit and Receive VPI/VCI's to be set independently, any VBrick can play any video stream without affecting it's transmit stream. As discussed earlier, over 100 VBricks can be configured in a single network without needing an external ATM switch.

The integral VBrick ATM switch is fully compatible with virtually all ATM switches. In fact, the VBrick Dual OC3 is practically invisible to the backbone switch except that each VBrick delivers video over standard


*FIGURE 2*

ATM VC's that the network can switch as needed.

Figure 2 shows how VBricks can be placed in between a new or existing ATM switch and workstation. In this case, the VBricks that are in series with the workstation are operating on their "own" VC's, while the workstation continues to operate on its VC (whether Switched or Permanent).

**Eliminate Multiple Home Runs**

It has been said that the value of a network is equal to the "square of the number of users". But it is important that cost of the network does not follow the same pattern.

Using VBrick's Dual OC3, it is easy to construct low cost physical fiber rings while maintaining a logical star. It is no longer necessary to "home run" a fiber from each remote video monitoring location to a ATM switch, nor is it necessary to deploy workgroup ATM switches just to get more ports to support the video.

**Summary**

VBrick's new Dual OC3 option:

- Reduces the need to add more ATM switch ports
- Reduces the need to deploy additional fiber
- Eliminate the need for ATM switches in many applications
- Automatically passes ATM Virtual Paths and Virtual Circuits from one port to the other.
- Automatically preserves the VPI/VCI mapping from port-to-port
- Passively monitors any VPI/VCI to decode MPEG and display TV-Quality video and CD-Quality audio
- Delivers MPEG streams on any ATM VPI/VCI