Why is it time for a new way to interconnect computers?

A Lightfleet Whitepaper by the Lightfleet Technical Staff

Overview

Over 25 years ago the computer industry moved from bus-based network interconnect methods, to “star” interconnect approaches, which required the use of serial switched "push" technology. There were really good and compelling reasons to make the change. Even though it was necessary, we have forgotten today just how irritating it was at the time. The move was greeted with much grumbling, moaning and general resistance. Change, no matter how essential, is a challenge for anyone. Any new approach is nearly always initially resisted. All of us like staying in our comfort zone. In this case, as the benefits and advantages of the new approach became ever more obvious, and more familiar, the resistance faded. Quickly thereafter, the newer methods promptly became the new “standard”. In the 25+ years since then, the change has proven to be – until recently - a successful transition.

But 25 years is a really long time in the world of computing. Nobody back then could have foreseen the astonishing changes that have come about in those intervening years. In fact, these technological innovations are happening at an ever-increasing rate. The networking technology providers responded by regularly adding more “features” in order to address the ever-changing needs. Thus, the complexity of protocols, switches and especially the software which implement networks inevitably grew, and grew, and grew, while the rate of performance improvement did not keep pace. The interconnect needs in 2018 are vastly different than they were in 1990. The limitations of the star serial “push” approach (now known generally as switched networks) are increasingly evident, and are now constricting the path forward.

Of course, like any time-tested and well-worn technology, we have become quite comfortable with it. We tolerate the complexities and no longer notice their idiosyncratic, irritating and limiting features. We now expect - and are comfortable living with - the inevitable work-arounds for such things as recovery of dropped packets resulting from extended latencies resulting from switching delays. Even though they are still there, we barely notice those shortcomings anymore. It is “just how things are”. Unfortunately, these layer-upon-layer of make-do’s are no longer able to provide the solutions that new systems require. We must allow today’s vast and ever-increasing quantities of information to flow more effectively. We cannot stay stuck in yesterday just because we are comfortable with it. As was the case over 25 years ago, it is time for another fundamental shift in how we interconnect things.

Today's networks:
inefficient by design

Since it is so easy to forget the widespread limitations of how we do things right now, let us review some of the challenges inherent in switched connectivity. First, switches are inherently serial, and cannot do native, simultaneous and true multicast. Switches drop packets, and suffer from jitter and lack of determinism. They require spanning trees, which in turn creates the need for a separate hardware and software control plane. Latency is unpredictable, and congestion is endemic. Efficient use
of the host servers is poor, and that contributes to high power consumption. To make matters worse, these old approaches have archaic, complex, and inefficient message protocols. These old protocols also create cyber security problems, as they are addressable – and thus hackable - from the outside. Separately, and also in combination, many of these factors negatively impact throughput, efficiency and real-world performance.

Multiflo™ from Lightfleet Corporation is a new and better interconnect, based on a completely different set of concepts. Multiflo addresses all of the switch limitations covered above. In addition, it also offers new and valuable features that switches do not. Multiflo is explicitly architected for parallel operation, and by-design, delivers data to multiple endpoints simultaneously (i.e. True Multicast) as easily as a single endpoint. It is modular, does not use spanning trees, and thus has no need for a control plane. It does not drop packets, and has built-in flow control. Multiflo does OSI levels 1, 2, 3, and some of 4, in hardware. It has better security and built-in error corrections codes. The hardware running all this is not exposed externally, thus providing better protection against hacking. It has no hackable processors.

In a nutshell, the new Multiflo connectivity provides the freedom to implement systems – small, large or huge - without all the limitations and restrictions inherent in those creaky, 25-year-old legacy switches. Multiflo is faster, more efficient, safer and vastly more expandable. Multiflo enables us to reach tomorrow’s needed performance levels more easily.

If you would like to know more about how this new approach, and how all that performance is achieved, Lightfleet has a number of white papers and benchmark reports available on its website: lightfleet.com.

Alternatively, you can contact Jay Brandon (VP Sales) at 360 816 2841. He’ll send you a short summary paper, called “The Essence of Multiflo,” which describes the key features that make these performance improvements possible.