

## **Carrier Ethernet Subcommittee**

### **Frequently Asked Questions (FAQ's)**

**Q) What exactly is “Carrier Ethernet” and how is it different than plain vanilla “Ethernet”?**

A: The term “Carrier Ethernet” has evolved over the years. It used to refer to any network carrying Ethernet that had 5-nines reliability. Then, it meant Ethernet hardware that had a few Carrier nice-to-haves, such as in-service software upgrades. Recently, the term has referred to Ethernet services that meet a set of criteria as defined by the MEF, the Metro Ethernet Forum.

The Ethernet Alliance would define “Carrier Ethernet” a bit more generically, as any Ethernet product or service that meets the demands of Carriers, with the acknowledgement that Carriers needs are constantly changing. While the MEF is focused primarily enabling the wholesaling of Ethernet services, the Ethernet Alliance will be addressing all aspects of Carrier Ethernet.

**Q) OK, well enough, but then what are the needs of Carriers and how is Carrier Ethernet different?**

A: Carrier Ethernet appends standard Enterprise Ethernet with additional features and protocols that provide the capabilities they need to deliver services to their customers.

For example, in traditional Ethernet, each end-user has their own MAC address, which works great for LAN's. However, when Carriers start transporting millions of user's data traffic, there is a need for MAC address isolation. While in an ideal world, everyone has a unique MAC address, unfortunately that is not always the case as sometimes NIC's and the MAC addresses embedded in them have been cloned. Ethernet's traditional flat addressing scheme can wreak havoc when two independent LAN's have been interconnected by a Carrier. IEEE standard 802.1ah, also known as MAC-in-MAC, solves this problem with hierarchical MAC addressing, allowing a Carrier to encapsulate the Ethernet it is transporting, preventing MAC address collisions.

**Q) Are there additional examples of where Carrier Ethernet differs from Enterprise offerings?**

A: Carriers often carry video traffic destined for a subset of users. Distribution of this type of content is usually by multicast, whereby the same packets are sent to all the multicast (IGMP) listeners. While this is not a problem for Layer 3 and above IP Routers that are aware of who the listeners are, this can be disastrous for traditional Layer 2 Ethernet switches, which automatically flood all ports with any and all multicast traffic that enters any single port. A single video stream on a single port can consume all of the available bandwidth of the switch. A Carrier Ethernet switch uses IGMP snooping to look at the ports and determine which ones do and do not have an IGMP listener, and will flood the multicast traffic only to those ports that actually want to receive them.

Another example would be VLAN tagging. Traditional Ethernet uses a 12-bit VLAN field, which yields 4095 VLAN tags, which is more than enough for traditional Enterprise LAN's. However, Carriers use VLAN tags to differentiate between customers and services, and with the onslaught of triple-play, HDTV, VoD, etc, 4095 is simply not enough tags. Carrier Ethernet networks support double-tagging, also known as QinQ, where the packets contain both an outer and inner VLAN identifier, thus vastly increasing the number of VLAN tags supported.

**Q) Where does Carrier Ethernet stand today?**

A: Ethernet has grown over the years from being a LAN protocol into practically all areas of communication. Today, Ethernet is the protocol of choice for Carriers, in their GMPLS backbones, their Metropolitan DWDM networks, and even their local access loops. However, there is still much work to be done. As Carrier needs change, so must Ethernet continue to evolve to meet these new demands.

**Q) What is next for Carrier Ethernet?**

A: With bandwidth consumption showing no signs of slowing, Carrier Ethernet networks are struggling to scale fast enough, so *scalability* is a

continuing area of need. As these networks scale frighteningly fast, *efficiency* becomes another key area of need. For example, if you move from 10-10GE ports/links to 100, you may not necessarily have increased your throughput 10X. *Latency* is increasingly becoming a new yet important need, as the internet and computing experience continues to become more real-time and high-performance computing clusters outgrow their buildings and become more distributed.

**Q) How can I become more involved in Carrier Ethernet and contribute to its success?**

A: Consider joining the Ethernet Alliance, and specifically the Carrier Ethernet Subcommittee. If your company is already a member of the Ethernet Alliance, then simply go online and sign-up. If your company has not yet joined, then you can still go online, fill out an application, and join the Carrier Ethernet Subcommittee meetings as our guest while your company considers the benefits of membership. And, be sure to notice the RSS feed that will bring our work right to your desktop, live as it occurs.