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IPv6-only networking for WLCG

Content

The use of IPv6 on the general internet continues to grow. Several Broadband/Mobile-phone companies, such as T-Mobile in the USA and BT/EE in the UK, now use IPv6-only networking with connectivity to the IPv4 legacy world enabled by the use of NAT64/DNS64/464XLAT. Large companies, such as Facebook, use IPv6-only networking within their internal networks, there being good management and performance reasons for this.

The transition of WLCG central and storage services to dual-stack IPv4/IPv6 has gone well, thus enabling the use of IPv6-only CPU resources as agreed by the WLCG Management Board. The use of dual-stack services is, however, a complex environment not only to configure and manage but also for trouble-shooting during observation of network performance and operational problems. WLCG is therefore actively considering when and where it can move to the much simpler environment of IPv6-only networking.

The HEPiX IPv6 working group has been encouraging and supporting the WLCG transition to IPv6 over many years. We last reported on our work to an ISGC conference in 2015. During 2020, the HEPiX IPv6 working group has been chasing and supporting the remaining transition to dual-stack storage services. We have investigated and fixed the reasons for the use of IPv4 between two dual-stack endpoints when IPv6 should be preferred. We present this work and the tests that have been made of IPv6-only CPU showing the successful use of IPv6 protocols in accessing WLCG services.

The dual-stack deployment, as mentioned above, does however result in a networking environment which is much more complex than when using just IPv4 or just IPv6. Some services, e.g. the EOS storage system at CERN, are using IPv6-only for internal communication, where possible. The IPv6 working group has been investigating the drivers for using data transfers over IPv6 and the removal of the IPv4 protocol in more places. We will present the areas where this could be useful and possible and be even so bold as to suggest a potential timetable for the end of support for IPv4 within WLCG.

There are many lessons we learned along the way which should be of interest to other research communities who have not yet started their transition to IPv6. Even more importantly for new research communities just starting to plan their distributed IT Infrastructure, there is a clear message to consider the use of IPv6-only right from the start.

Summary

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