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A phased phase-out plan for IPv4 at a WLCG Tier-1 site

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Universities and research institutes have been early adopters of IPv4, which have served scientific research infrastructure well in the past. But now the time has come to let go of the legacy protocol with awkward limits, and phase it out in favour of IPv6.

The World-wide LHC Computing Grid (WLCG) is half-way through the transition from IPv4 to IPv6, with almost all services now being dual-stack with both IPv4 and IPv6. Now the time has come to plan for the rest, where we discard the complexity of dual stack in favor of IPv6-only operations.

The driver for doing this in the Nordic Tier-1 site (NT1) sooner rather than later is that we forsee a significant risk of running out of IPv4 addresses when scaling storage servers horizontally in order to handle the High Luminosity LHC (HL-LHC) data rates. We expect to have a data rate of 10-20 times when HL-LHC comes online in 2030, and the most cost-effective way to serve this is to have a larger number storage servers than today. And in order to prove that we are ready for HL-LHC data taking in 2030, it would be good to finish the bulk of the phase-out of IPv4 by Data Challenge 2027

This move comes with lots of constraints though. Since it is only “almost all” services that understand IPv6 today, we cannot completely shut IPv4 down without considerations on how the legacy systems can access data. There might also be unknown dependencies on IPv4 in access or management of services, that we will only detect in testing or production. Individual scientists might want to access the data outside of the grid, for instance from their own laptop which might not have IPv6 yet. There are even reasons that the physics experiments might want to run legacy software for reproducability, some of it too old for IPv6 support.

Together this indicates a phased approach, and this talk will concentrate on the planning and current status of this effort, with steps towards the end goal and tentative timing of them.

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