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DISSERTATION TITLE: *Monitoring and understanding IPv6 adoption*

Since its beginning, the Internet has undergone an unforeseen evolution, becoming an indispensable tool that is used daily for both personal and business purposes. Yet, the core part of the protocol suite, TCP/IP, that underpins the Internet has been fairly static. The Internet Protocol (IP) is one of the core protocols providing support for the addressing and routing in the Internet. IP version 4 (IPv4) was the first version of this protocol to be widely deployed. However, the unexpected expansion of the Internet prompted, as early as in 1992, the need to devise solutions for the future depletion of the IPv4 address space. These efforts eventually led to introducing and standardizing the IPv6 protocol in 1998 as a permanent alternative to IPv4. Speaking in terms of addresses, IPv6 significantly expanded the number of available addresses. However, IPv6 is not backward compatible with IPv4. Despite having been proposed more than 20 years ago, IPv6 uptake has been relatively slow. This research focuses on understanding of the IPv6 adoption in the Internet. The complexity and scale of the IPv4 to IPv6 transition makes this process the largest change in the Internet infrastructure to date. This process affects the broader Internet ecosystem including content and access network providers, consumer electronics manufacturers, application software developers and industries supporting network management and security. The Internet's ongoing expansion and the different factors that influence the adoption contribute even more to the complexity of the transition. Hence, understanding the IPv6 adoption in the Internet requires not only large-scale measurements to characterize factors that influence the adoption, but also a model that simulates the adoption process and provides insights for regulators and stakeholders. The findings of this research indicate that the IPv6 adoption may be decades away. A large scale growth in demand for addresses seems to be the only accelerator for the adoption.